# PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DESIGN • MANUFACTURE • FINISHING • USE

# These MONARCH-MEN

## are ready to serve you...NOW!

These carefully selected Monarch-Men are located in the heart of industry's busiest areas.

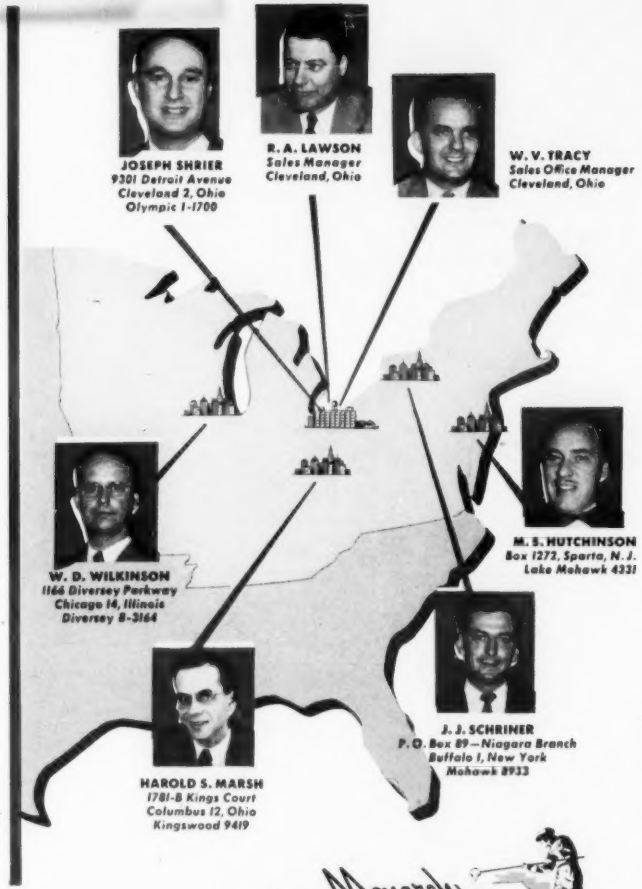
They offer expert analysis...production experience and practical assistance should any trouble develop.

They are exclusively Monarch-employed, trained in aluminum permanent mold, aluminum and zinc die casting production methods.

*Meet your Monarch-Man...* get to know him well. Let him help you solve difficult production problems with Monarch's proved facilities for casting, finishing and complete product assembly... all in one modern plant.

You can depend upon your Monarch-Man. He represents 38 years of experience that the men and women at Monarch have contributed to the advancement of the casting industry.

*Reprints of this advertisement for your source file are available upon request.*



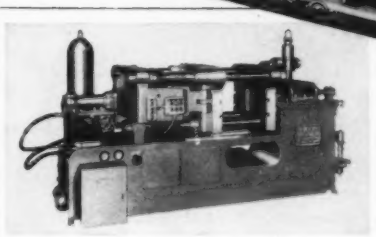
**MONARCH ALUMINUM MFG. COMPANY** • *Detroit Avenue at West 93rd Street, Cleveland 2, Ohio*

For additional information circle No. 44 on the Reader Service Card

# KUX

## FIRST NAME IN DIE CASTING MACHINES

### HELPS MAKE HUBLEY
### FIRST NAME IN ACTION TOYS



**MODEL BH-30**
Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

THE TEXAN

Boys hate to be called, "sissy". To prove they're not, they go to great lengths to be rough and tough. That means their toys, too, have to be rough and tough. Hubley Manufacturing Company, by using KUX die casting machines in the manufacture of its "Texan" Repeater Pistol, gets that extra ruggedness necessary in producing toys that last.

WHAT ABOUT YOUR PRODUCT? Does it stand up to the treatment it has to take? KUX die casting machines can tremendously improve its quality and saleability. Call KUX now! Let us show you how!

**KUX MACHINE COMPANY • 6725 N. Ridge, Chicago 26, Illinois**

# KUX

## FIRST NAME IN DIE CASTING MACHINES
## SELECTED BY FIRST NAMES IN INDUSTRY

*For additional information circle No. 34 on the Reader Service Card*

DECEMBER 1951
Vol. 9 No. 12

# PRECISION METAL MOLDING

DIE CASTINGS • INVESTMENT CASTINGS • POWDER METALLURGY
PERMANENT MOLD CASTINGS • PLASTER MOLD CASTINGS

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# If you need ALUMINUM CASTINGS for your DEFENSE PRODUCTION...

## Send for this NEW BULLETIN

HOW Aluminum Industries, Inc., is supporting defense contract holders with first-class service on their aluminum castings needs is outlined in this new Bulletin No. 20-A.

The chemical and metallurgical laboratories, completely equipped for strict quality control . . . the pattern shop . . . the foundry with its 2,500,000 pounds monthly capacity (one of the largest in the United States) . . . the tool room, where skilled tool and die makers turn out precision work on the latest type machine tools . . . the engineering department staffed by engineers who from long specialized experience with aluminum know how to help you realize maximum benefits from the use of aluminum castings — these and other Aluminum Industries facilities for serving you are illustrated and described in this new bulletin.

If you are seeking a dependable, proven source of supply for aluminum castings made to your requirements, in any sizes and in any quantities, it will pay you to ask for our recommendations and quotations.

Bulletin No. 20-A is free to any defense contract holder who wants to be sure he can obtain the type of aluminum castings he needs to help keep his defense production moving smoothly. Send for it today.

PERMITE

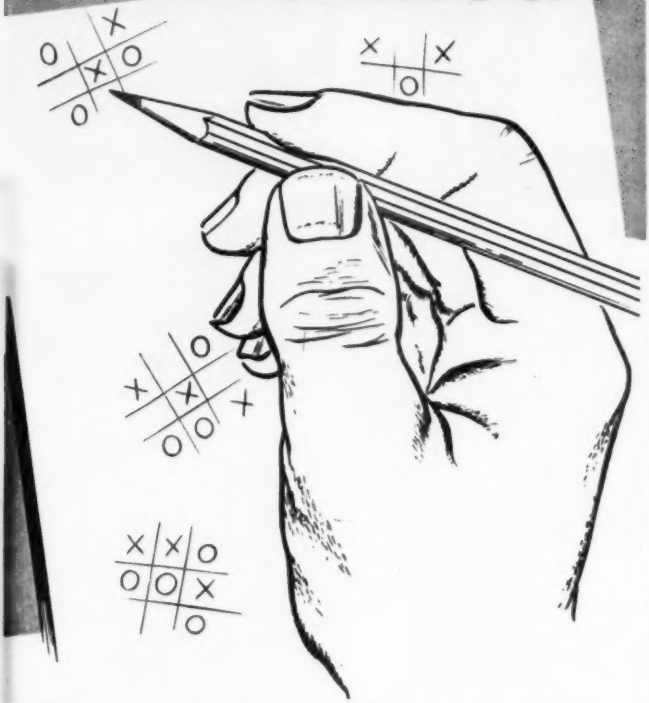
**ALUMINUM INDUSTRIES, INC.**

CINCINNATI 25, OHIO

ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS

*For additional information circle No. 10 of the Readers Service Card*

# Are You Puzzled?



**Yes, die castings are different. It takes more than machines to produce die castings.**

Die Castings are Newton-New Haven's business. Here is an organization that has production and engineering talent to help you with your die casting problems.

Newton-New Haven has prepared a booklet on "Dimensioning Die Castings." This is basic data that every Engineer and Designer should have. Write on your company letterhead for your copy.

NEWTON NEW HAVEN

THE NEWTON-NEW HAVEN COMPANY

689 THIRD AVENUE • WEST HAVEN 16 • CONNECTICUT

*For additional information circle No. 51 on the Reader Service Card*


# LETTERS TO THE EDITOR

## ALUMINUM ALLOY SPECS

We are currently examining all our specifications with regard to aluminum die-cast alloys. The program is intended to result in the proper choice of alloys from the standpoint of castability, quality of surface finish, anodizability and corrosion resistance, in addition to the required mechanical properties.

In view of the above program we are interested in finding references on the following subjects:

1. Choice of aluminum die casting alloys for industrial applications based on chemical, physical and mechanical properties.

2. Surface finishing and treatment of Die Castings with special emphasis on anodizing.

We are informed that you have from time to time published information on the above subject matter. We would be pleased if you could direct us to some specific articles on this problem, either in your publication or in others concerned with related matters. — J.B.

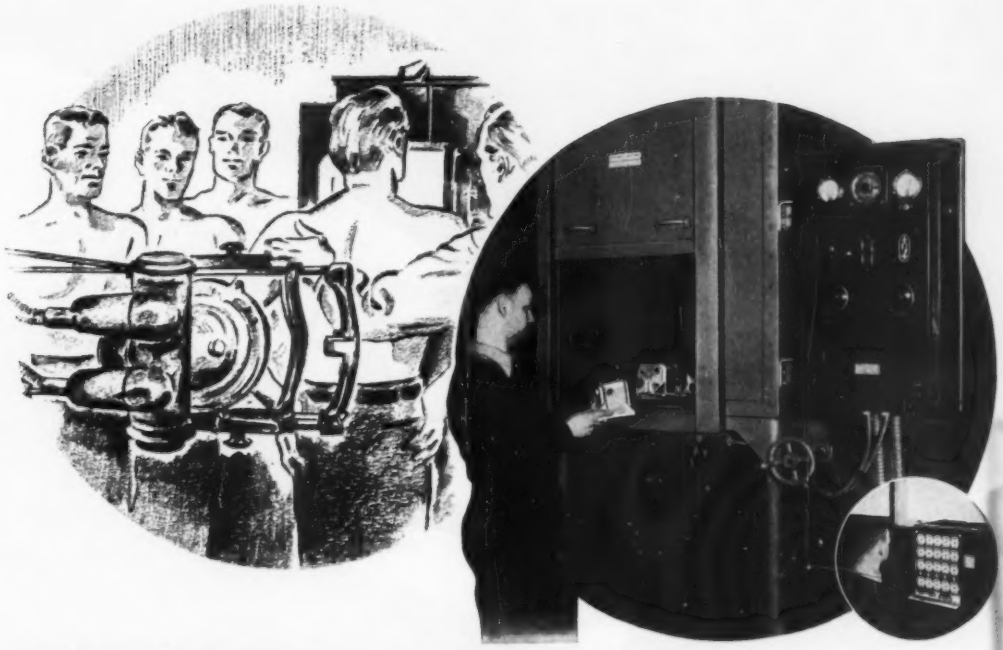
*Several articles from Die Castings have been sent, including one "Which Aluminum Alloy for Your Product?" and others on alloy selection or special finishing considerations for aluminum die castings. Several alloy suppliers have also published excellent reference material on aluminum alloys, properties, composition and suitability for individual purposes. We have requested these suppliers to forward their data. Three books have also been recommended dealing wholly or partially with this subject. — Ed.*

## SAFETY MANUAL

In your October issue of Precision Metal Molding on page 42 you had an article on Safety Committee Honored. Could you please tell me where this safety manual on die casting can be purchased? — C.M.L.

*The Safety Manual for the die*

continued on page 8



# PARKER USES X-RAY too . . . to Assure Perfect Castings!

DURING the production of your Die Casting requirements here at Parker, specially designed X-Ray equipment is frequently used to carefully check your castings. From the original planning stage through the finished castings, a 16-Point Production Control System analyzes each phase of production, thus guaranteeing that **YOUR** requirements will be met . . . exactly. For more than a half century Parker research has helped our customers obtain the finest die castings possible. Parker's X-Ray testing technique is another example of how Parker's long experience pays off for **YOU!**

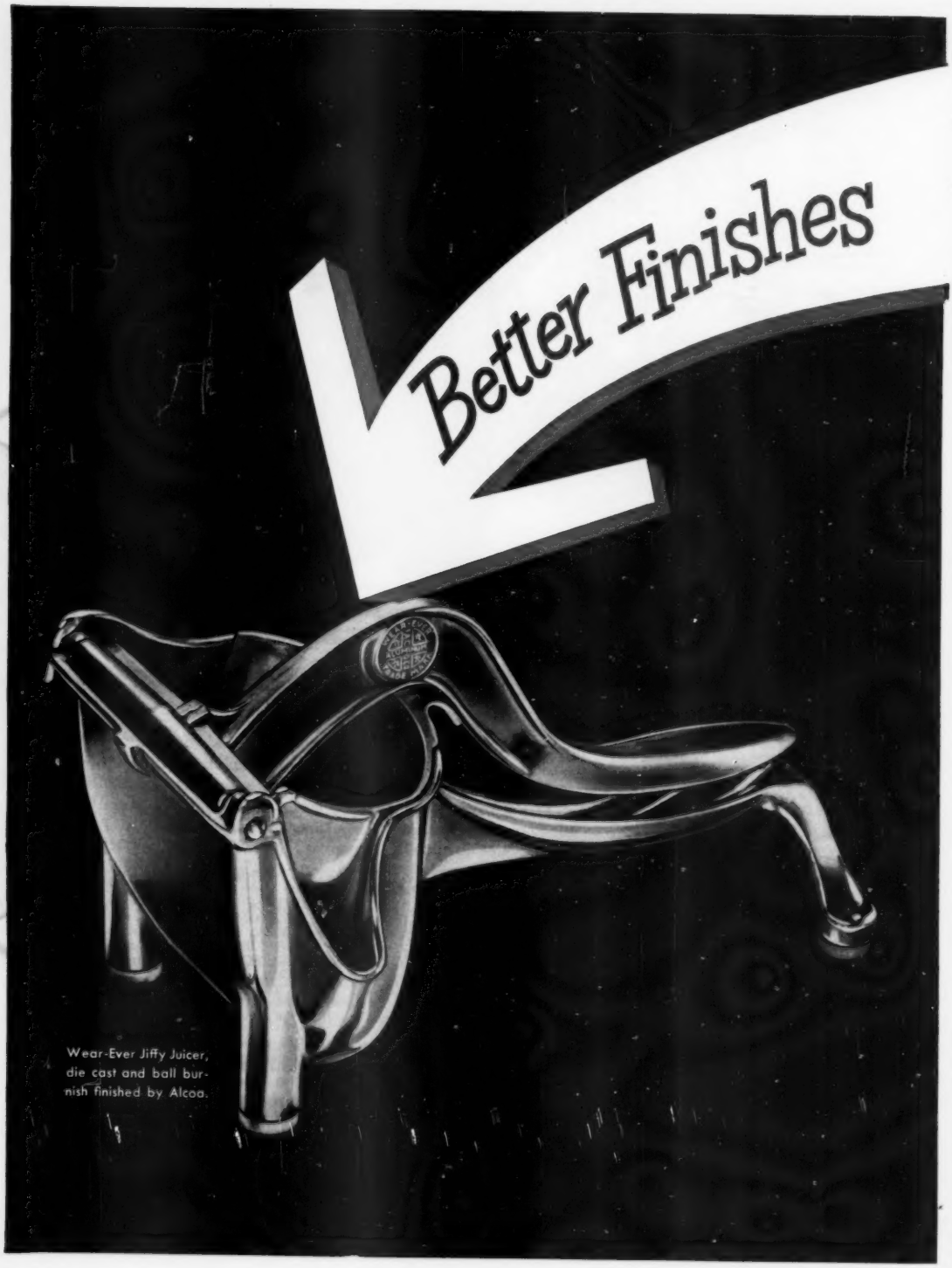
*And when you think of Die Castings*
**- - THINK OF**

OLLIE J. BERGER COMPANY, 139 North Clark Street, Room 1415, Chicago 2, Ill. Dearborn 2-4954 • O. H. BROXTERMAN & SON, 2174 Buck Street, Cincinnati, Ohio Cherry 1623 • H. R. LaMONTAGNE, P. O. Box 969, 76 Mill Street, Springfield, Mass. Phone 6-3642 • J. C. PALMER, 712 State Tower Bldg., Syracuse, New York, Phone 2-0194 • G. L. PALMER, 97 Spring St., Metuchen , N. J. Phone 6-0525 • MR. J. G. HODGSON, 2832 East Grand Blvd., Detroit 11, Michigan Trinity 1-9385 • EDWARD F. HIGGINS, JR., 4931 Laclede Avenue, St. Louis 8, Mo. Forest 6541 • LARRY WARD, 1500 LaSalle Avenue, Minneapolis, Minn. • WARREN OLSON, 612 E. Bishop Street, Bellefonte, Pa. Phone 2951 • D. F. MARSH, 35 Chestnut St., Girard, Penna. Phone 528R Girard, Pa.

**Parker White-Metal Company • 2153 McKinley Ave. Erie, Penna.**

**PARKER** ALUMINUM *and* ZINC *Die Castings*

*For additional information circle No. 54 on the Readers Service Card*


Better Finishes
Wear-Ever Jiffy Juicer, die cast and ball burnish finished by Alcoa.

# Another advantage of ALUMINUM die castings made by ALCOA

No matter how many calls we make, we still find designers who feel that aluminum die castings are difficult to finish.

*But the fact remains that all finishes*—painted, plated, anodized, mechanical and chemical—*are practical and economical for aluminum.* And that these finishes are extending the use of Alcoa Die Castings to new fields—through better appearance, better corrosion resistance, better abrasion resistance.

The best way to investigate finishes for Alcoa Die Castings is to talk over your product with an Alcoa specialist. From the many Alcoa-Developed Alloys, he'll help you select the one that meets your finishing needs without sacrificing mechanical requirements or boosting the casting's cost. You'll find him listed under "aluminum" in your classified phone book.

Or write: ALUMINUM COMPANY OF AMERICA, 1895M Gulf Bldg., Pittsburgh 19, Pa.

**PAINTED**—The cast surfaces of Alcoa Die Castings provide good adherence for paint, enamel and lacquer. Precaution should be taken to remove any oil from the casting. Special pretreatment is not usually required.

**MECHANICAL**—Ball burnishing gives a lustrous, slightly work-hardened surface to aluminum die castings. It requires very little investment in physical equipment or man hours. Other economical mechanical finishes include polishing and scratchbrushing.

**ANODIZED**—Anodic coatings are hard and smooth—integral with the metal. They will not chip or peel. Besides increasing the casting's resistance to corrosion and abrasion, they add interesting decorative effects. The black finish is most widely used on Alcoa Die Castings, but a wide range of colors is also available.

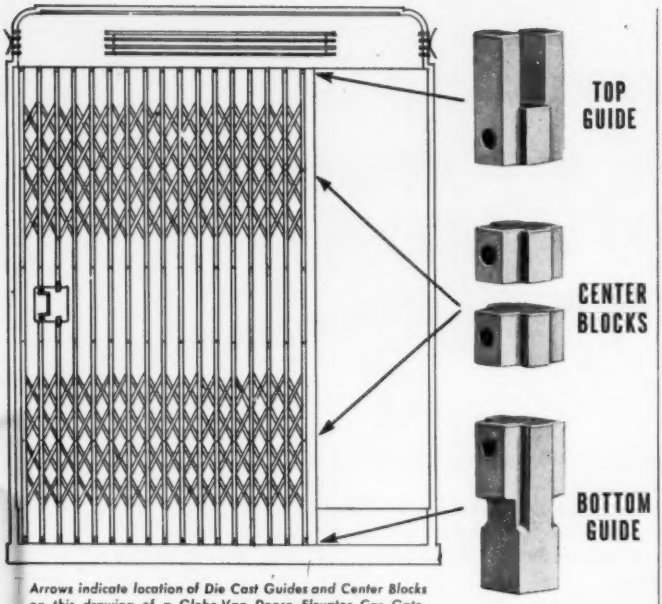
**PLATED**—Alcoa Die Castings may be plated with chromium, nickel, copper, gold or silver, just as die castings of other metals. The Alcoa-Developed zinc immersion process makes electroplating economical and practical on aluminum.

ALCOA

**MAKES ESSENTIAL DIE CASTINGS FOR MILITARY AND NON-MILITARY USES**

**ALUMINUM & MAGNESIUM**

*For additional information circle No. 9 on the Reader Service Card*




*Arrows indicate location of Die Cast Guides and Center Blocks on this drawing of a Globe-Van Doorn Elevator Car Gate.*

**DIE CAST Guides and Center Blocks**

**SIMPLIFY FABRICATION OF COLLAPSIBLE GATES FOR ELEVATOR CARS—**

Some years ago the Globe-Van Doorn Corporation of Milwaukee sought ways and means to speed up and simplify fabrication of the collapsible gates for its elevator cars . . . and, if possible, to reduce costs at the same time.

One move which helped to accomplish all three objectives was the die casting of the top-and-bottom guides as well as the center blocks, which are vital units in the gate assembly. Four such units (2 guides and 2 center blocks) are riveted in place in each upright channel . . . and there usually are at least 16 uprights in each gate.

Formerly made of brass extrusions . . . which had to go through a number of precise machining operations . . . these guides and blocks are now delivered ready-for-use. Even the rivet hole is accurately cast-in. The net result is faster, easier fabrication of collapsible gates at substantially lower costs.

Possibly die castings by MILWAUKEE can help you achieve similar results.

**MILWAUKEE DIE CASTING COMPANY**
1019 N. FOURTH STREET • MILWAUKEE 3, WISCONSIN

*For additional information circle No. 42 on the Reader Service Card*


LETTERS TO THE EDITOR
continued from page 4

*casting industry can be obtained from the American Die Casting Institute, 366 Madison Ave., New York 17, N. Y. Price of this very valuable book is $5.00. It has been compiled by a committee of the Institute from the collective experiences of active die casting companies and is the first publication of its kind giving practical, direct information concerning safety in this field.—Ed.*

### POWDERED IRON ROTATING BANDS

Your September issue of PRECISION METAL MOLDING contained a most interesting article on powdered iron rotating bands by Mr. M. T. Victor of International Powder Metallurgy, Inc. Have contacted Mr. Victor regarding the possibility of obtaining a couple of extra copies of the article and he advised that he does not have reprints.

Am very much interested in obtaining five or ten copies of this article and if you could provide me with tear sheets, I will arrange to have the article put in the hands of a number of interested people. — C.O.H.

*Tear sheets forwarded.—Ed.*

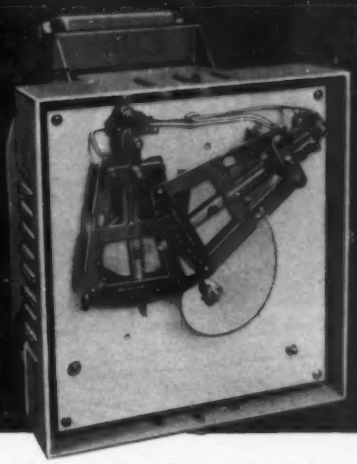
### 60,000 PSI VS 180,000 PSI

The article entitled, "Structural Parts by Powder Metallurgy", which appeared on Page 45 of your September, 1951 issue, has just come to my attention.

Table I of this article, which refers to copper impregnated iron, definitely leaves an erroneous impression with the reader. You speak of tensile strengths for copper impregnated iron to 60,000 p.s.i. We have developed copper impregnated iron and steel parts which, in the laboratory develop tensile strengths up to 180,000 p.s.i. and which in production of jet engine compressor blades in quantities exceeding 100,000 per month, consistently develop ultimate tensile strengths to 100,000 to 125,000 p.s.i.

continued on page 72

# DIE CASTING prevents "profit corrosion"



CASE HISTORIES FROM MT. VERNON FILES

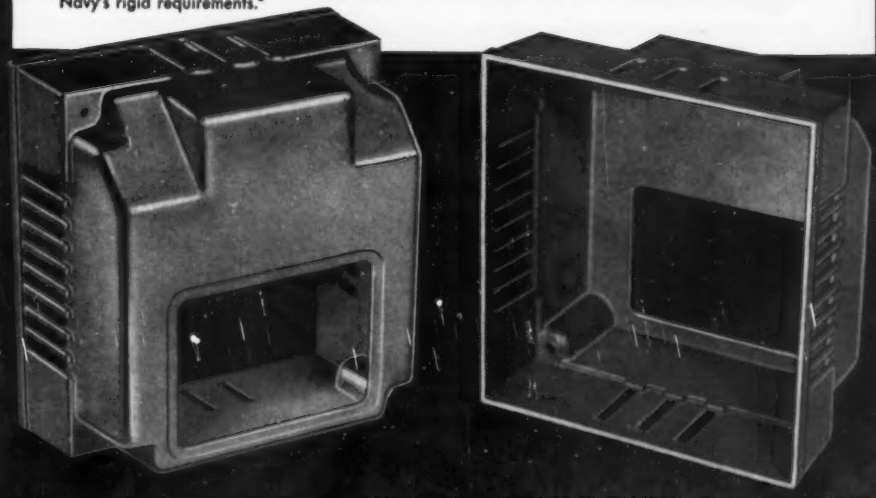
Nothing is so detrimental to profitable production as *waste of time and material.*

That's why you can benefit by giving serious thought to die casting, for die casting is industry's high-speed, cost-cutting method — promoting economy from start to finish on any production job.

Take for example, this temperature and humidity measuring instrument, used by the U. S. Navy to maintain non-corrosive atmospheric conditions aboard mothballed ships: Definite savings are realized by die casting the housing, because die casting produces this component *instantly*—and with maximum economy of metal. Not only are costs held down, but a superior product is obtained—strong, light, good looking, and adaptable to any type of finish.

Says The Instruments Corporation: "This Mount Vernon casting has proved itself to be the most satisfactory as well as the most economical housing that could be produced for the purpose. We consider it amply fulfills the Navy's rigid requirements."

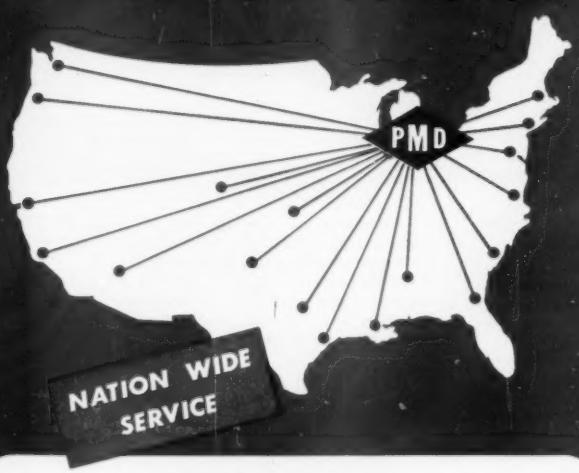
Whenever *you* need a part or product made, therefore, don't forget die casting. Let us know your problems; send us your specifications. We've steered numerous manufacturers to high-output, low-cost production... shown them how to prevent *time waste* and *material waste* from eating into their profits.



For additional information circle No. 46 on the Reader Service Card

# IMPROVE

YOUR PRODUCT...
YOUR PRODUCTION...




WITH PMD DIE CASTING DIES, PERMANENT MOLDS AND CORES

PMD top quality die cast dies, permanent molds and cores precision made to meet the most exacting specifications.

PMD has the facilities to make prompt shipments to all national industrial areas.

PMD your reliable source for all types of dies, permanent molds and cores, offers the services of its engineering and production facilities.

*Write today for prompt service on your requirements.*

**PERMANENT MOLD DIE CO., INC.**

*For additional information circle No. 77 on the Reader Service Card*


## OFFERED IN THIS MONTH'S ADS

NOTE: Circle numbers on the enclosed post-card to indicate literature, samples or trial services you wish to receive.

No. 5. DIE CASTING, machining, painting and plating facilities of the Admiral Die Casting Corp. are shown in a bulletin offered by the company.

No. 6. "WE'RE GEARED FOR YOUR DEFENSE NEEDS" is a booklet explaining the Advance Tool & Die Casting Co.'s facilities for producing die castings.

No. 8. CONTROLLED BARREL FINISHING by the Supersheen method is described in detail in "Advanced Barrel Finishing", a booklet offered by Almco Division, Queen Stove Works, Inc.

No. 10. THE MODERN FACILITIES available at Aluminum Industries, Inc. for turning out aluminum castings are described and illustrated in a bulletin available from that company.

No. 15. CUTTING MACHINING COSTS on die castings by speeding-up the machining through the use of Bellows air devices is the theme behind the Foto Facts File offered by the Bellows Co. The File contains case histories of production jobs where savings were made in this way.

No. 19. A NON-ETCHING CLEANER specifically compounded for aluminum alloys, Cowles AM Cleaner, is explained in technical data sheets available from the Cowles Chemical Company.

No. 20. A ONE POUND DIE CASTING MACHINE, DCMT's Model IMP/96, is the subject of literature offered by the DCMT Sales Corp. The IMP/96 is an improvement on the M55A model in that it, among other things, can be used more easily in the production of larger and heavier castings.

No. 21. AN ELECTRO-CLEANER AND SURFACE CONDITIONER, Diversey 505, designed especially for use on zinc base die castings is described in product information available from the Diversey Corp. Diversey 505 is used for reverse current electro-cleaning and surface conditioning prior to electroplating.

# DO's and DON'Ts in DESIGNING ZINC and ALUMINUM DIE CASTINGS

## examples by DOLLIN

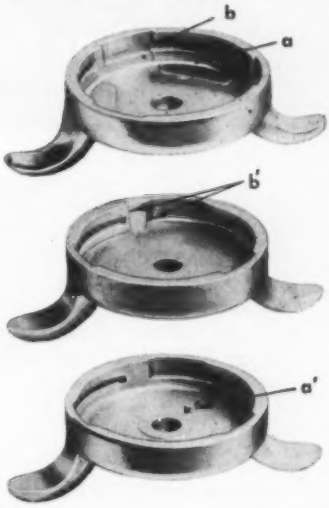
PRINCIPLE: Wherever possible, parting lines should be positioned so that seams are removed automatically in the course of an expected machining operation.

EXAMPLE: The original design for this cake decorator top required two operations after casting: (1) boring the critical inside diameter and cutting groove **a** (2) scraping seam **b** out of the breech lock by hand.

Dollin engineers suggested re-positioning the seams at **b'** (second picture — Dollin casting before machining), so that removal would be automatic when the i.d. was bored.

Picture three shows the Dollin casting ready for plating. Preparation required only one operation — boring the i.d. In addition, groove **a'** was extended (as shown) to increase the attractiveness of the part, and make it easier to keep clean.

RESULT: Lower costs and an improved product for the manufacturer.




Dollin engineers will work with you on design refinements, recommending whatever changes will simplify the die casting operation, improve the soundness of the castings, or eliminate machining, finishing, or assembly operations. They have at their disposal extensive, modern facilities, and are thus free to adapt designs for lowest final cost.

Dollin can efficiently produce all commercial sizes of die castings — facilities include large plunger zinc machines, large and medium size cold chamber high pressure machines, and a separate small castings department. Write for estimates and engineering advice at no obligation.

SPECIAL SMALL CASTINGS DEPARTMENT

For low die and casting costs: small single or double cavity dies — high speed automatic machines.

PRIME CONTRACTORS—CHECK WITH DOLLIN FOR SUB-CONTRACTING ON DEFENSE ORDERS

**DOLLIN** CORPORATION
614 So. 21st St.
Irvington 11, New Jersey

SALES OFFICES: Detroit • Philadelphia • Chicago • Boston
St. Louis • Buffalo • Canton • St. Paul • Pittsburgh

*For additional information circle No. 22 on the Reader Service Card*

In tanks, guns, bombs, shells and missiles; ships, planes, trucks, jeeps; radio, sonar, radar . . . almost everything you can mention in the realm of war materiel—more and more of the component parts are being made of metal powders. This modern material has become increasingly important to the quality, the faster output or the lower cost of production of these products.

**Plastic Metals** has been a leading producer of metal powders for 17 years—and is at present supplying metal powders for many of these Ordnance items. Iron, nickel, manganese, silicon and magnetic iron oxide powders—and combinations of metal powders to meet exacting requirements are being produced daily by Plastic Metals.

If you are manufacturing any parts for military materiel—or for any civilian product where shortage of metals is causing a serious problem—we shall be glad to put you in touch with qualified Metal Powder Fabricators with whom it may pay you to discuss the possibilities and advantages of metal powder parts to meet your specific needs.

**PLASTIC METALS**
DIVISION OF THE NATIONAL RADIATOR COMPANY
JOHNSTOWN, PENNSYLVANIA

*For additional information circle No. 48 on the Reader Service Card*

continued from page 10

No. 23. A COMPACT, COMPLETELY AUTOMATIC DRILL HEAD with self-contained air and controlled feed and speed is described in a catalog offered by The Dumore Co.

No. 27. UNIQUE PRODUCTION FACILITIES for turning out their "smallness unlimited" zinc die castings are described in literature available together with sample castings from the Gries Reproducer Corp.

No. 28. ELIMINATION OF A SEPARATE TAPPING OPERATION is the feature when using Tap-Lok screw thread inserts. These inserts are made of hardened steel and cut their own threads in drilled or cored holes. Samples and literature will be sent by the Groov-Pin Corporation.

No. 31. ALUMINUM DIE CASTINGS up to 12 lbs. in weight can be made with the Hydraulic Press Mfg. Co.'s new die casting machine. This machine is described in a catalog offered by HPM.

No. 33. SAVINGS INHERENT IN THE INVESTMENT CASTING PROCESS are explained in a booklet available from Investment Casting Co.

No. 36. THE LOWERING OF PRODUCTION COSTS and reducing of production problems through the use of die cast magnesium and aluminum alloys is explained in literature and design information available from Litemetal Dicast, Inc.

No. 38. FILTERS WITH NO MOVING OR WEARING PARTS for hydraulic and circulating systems are the subject of a detailed study issued by the Marvel Engineering Company.

No. 40. IMPREGNATION OF POROUS CASTINGS by the Mogullizing system is explained in literature offered by the Metallizing Company of America.

No. 44. WHERE TO GO for help with difficult production problems in casting, finishing and assembly is the theme of the Monarch Aluminum Mfg. Company's advertisement showing a map of the eastern half of the United States together with locations of the Monarch Men. Reprints of this ad for your source file are available.

continued on page 71

# Better CASTINGS Faster

## NEW DCMT DIECASTING MACHINE Model IMP/96

### NEW IMPACT INJECTION...

utilizing a heavy large diameter piston rod, and valve-in-head construction . . . produces smoothest finish and most homogenous castings yet.

### NEW OPENING AND CLOSING UNIT

. . . "beefed up" to withstand the vastly increased injection impact . . . operates at lightning-fast speed.

### OTHER FEATURES

. . . new, heavier, more rigid base construction . . . larger pot . . . larger die castings . . . wider die-opening.

*Write for details*

**Newest, highest-speed small die-casting machine on the market — by the manufacturer of the world's largest-selling die-casting machines.**

**DCMT SALES CORPORATION**

164 DUANE STREET • NEW YORK 3, N. Y.

## *From Blueprint to Finished Part*

**For Military or Essential Civilian Zinc Alloy Die Castings Consult**

# SCHULTZ

Our ability consistently to furnish dimensionally accurate castings with superior surface finish has established us as a leading supplier of zinc base alloy die castings. Our engineers will welcome the opportunity of demonstrating how these advantages can be incorporated in your products.

**SCHULTZ DIE CASTING COMPANY**
**1810 CLINTON STREET • TOLEDO 7, OHIO**

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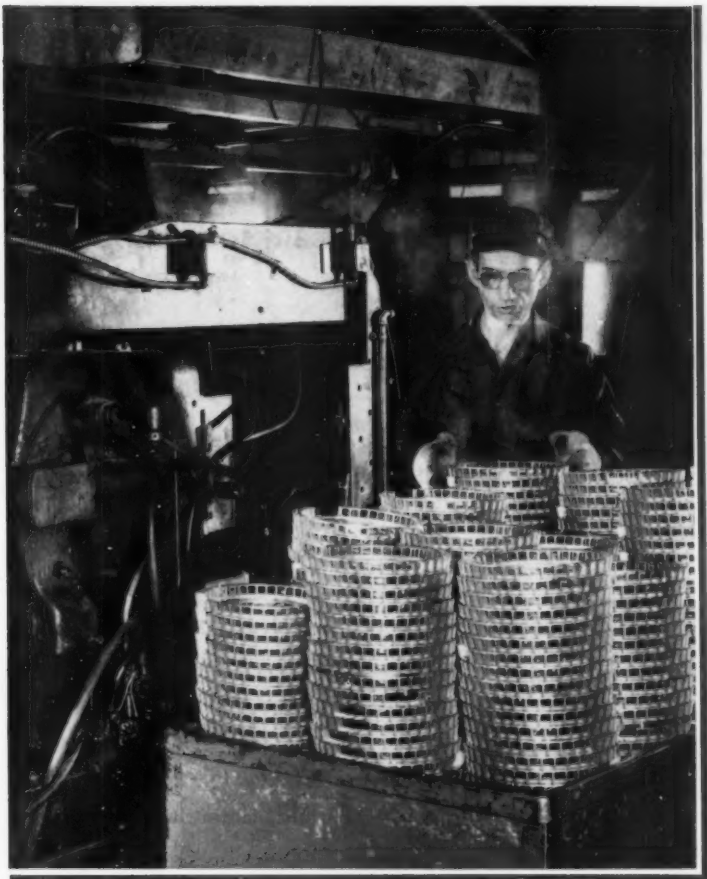

# Just drain and refill...for safety

For greater *safety* for employes . . . greater *safety* for equipment . . . greater *safety* for buildings . . . just drain your hydraulic systems and refill with Monsanto's Pydraul F-9.

Nonflammable-type Pydraul F-9 is designed for machines requiring a fluid power-transfer medium. You can convert to its use without changing equipment.

The nonflammability of Pydraul F-9, the key to greater safety, has been proved in numerous tests such as the following:

Pydraul F-9 did not flash or ignite when sprayed, dripped or flooded on molten metal heated to approximately 1,500° F.

Pydraul F-9 did not flash or ignite when sprayed, at 1,000 p.s.i., into the 6,000° F. zone of an oxyacetylene welding torch flame.

You get a bonus of *efficiency* and *economy* in addition to *safety* when you change to Pydraul F-9. The fluid shows high resistance to mechanical shear and chemical breakdown. It is high in lubricity and does not corrode metals from which machines ordinarily are constructed.

Why not investigate Pydraul F-9 today. See what it offers you in greater *safety* and assurance of uninterrupted production. For details contact the nearest Monsanto Sales Office or write for a copy of Monsanto Technical Bulletin O-75. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1749-K South Second Street, St. Louis 4, Mo.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

**PROPERTIES OF PYDRAUL F-9**

| | |
|---|---|
| Appearance | Clear, oily liquid |
| Color | Light amber (APHA 350) |
| Specific Gravity | 1.268 |
| Weight per Gallon | 10.56 |
| Acidity (mg. KOH/gm.) | Less than 0.1 |
| Odor | Mild, pleasant |
| Pour Point | +5° F. |
| Hydrolysis Stability | Neut. No. less than 0.1 before and after hydrolysis |
| Autogenous Ignition Point | Above 1100° F. |
| Viscosity at 100° F. | 49.5—58.0 Centistokes 229—269 S. U. S. |
| at 210° F. | 5.6—6.0 Centistokes 44.5—45.8 S. U. S. |

*Pydraul: Reg. U. S. Pat. Off.*

MONSANTO
CHEMICALS – PLASTICS

Serving Industry... Which Serves Mankind

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# DIE CASTING— the fastest & most economical method of mass production

Speed of production is the outstanding advantage of the die casting process. Three hundred complex die castings per hour are not unusual, and multiple cavity dies can bring the rate per hour into thousands. Die casting can halve and sometimes quarter the man-hours needed by other methods.

Zinc is the most widely used of all basic materials for die casting. It is strong, easy to machine and reproduces details with great accuracy. Furthermore, zinc can be given almost every type of plastic, paint or metal finish at low cost.

***DIE CASTING is the Process • ZINC, the Metal BUNKER HILL, the Preferred Zinc***

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*Eastern Sales Agents*

**NORTHWEST LEAD COMPANY**
SEATTLE, WASHINGTON
*Sales Office for Pacific Coast*

# BUNKER HILL 99.99+% ZINC

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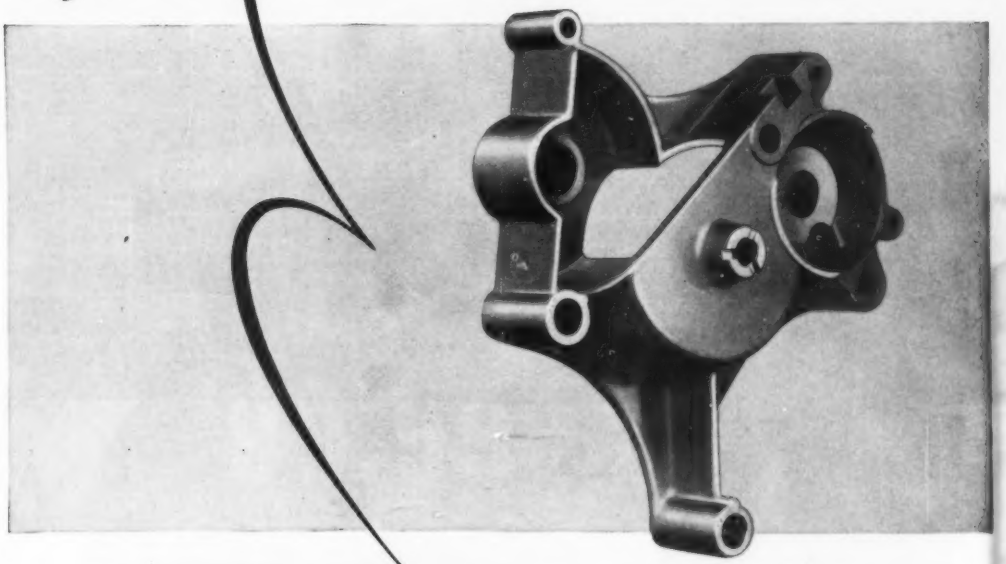
# *Flexible* DESIGN POTENTIALS



*with* **MADISON-KIPP** *Zinc and Aluminum* **DIE CASTINGS**

Gear centers, bolt holes, strengthening ribs, bosses, lugs and cavities are all included in the frame die casting here illustrated.

The Madison-Kipp die casting process is ideal for producing the "special" shapes that offer the designer such marked manufacturing advantages and often at substantial savings. Please send all inquiries to our home office in Madison, Wisconsin.

## MADISON-KIPP CORPORATION

**213 WAUBESA STREET, MADISON 10, WIS., U.S.A.**

ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

- *Skilled in* DIE CASTING *Mechanics*
- *Experienced in* LUBRICATION *Engineering*
- *Originators of Really High Speed* AIR TOOLS

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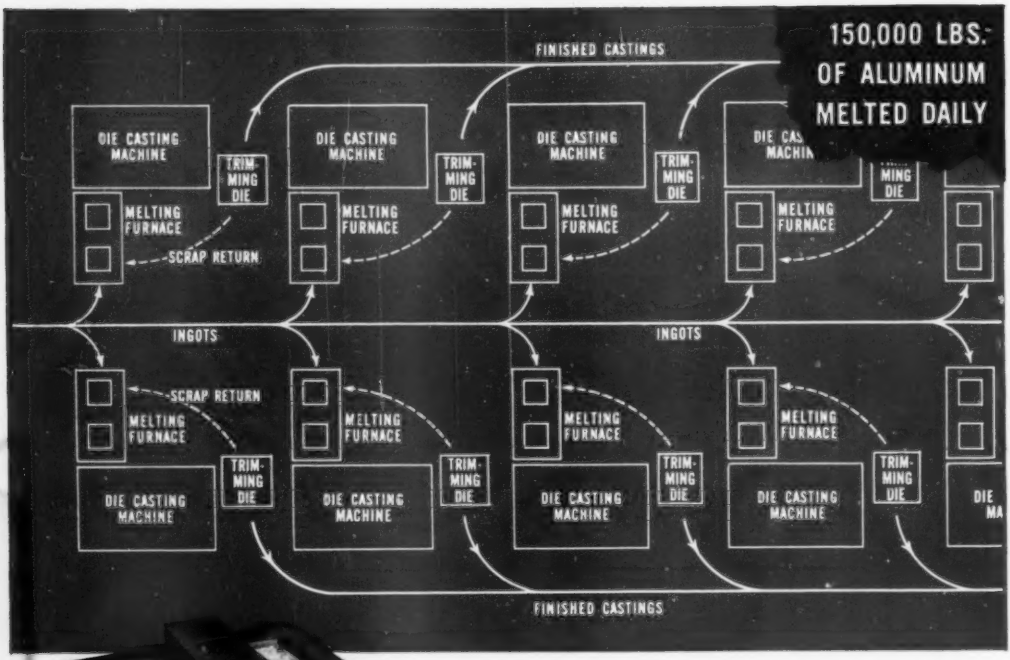

One of the nation's newest die-casting plants uses 15 Lindberg Two-Chamber Furnaces in their die casting operations. These furnaces, operating on a 24 hour a day schedule have the capacity to melt 150,000 lbs. of alloy per day. Each furnace serves a separate die casting machine to produce these production advantages . . .

**No melting room needed**—all metal is melted at the casting machine, eliminating the need for carrying hot metal through the plant.

**No scrap sorting**—scrap metal and reject castings never leave the machine, allowing the use of a different alloy in each machine if necessary, while completely eliminating scrap sorting, handling and identification problems.

**Unified production unit**—each die casting machine becomes a unified production unit—receiving cold alloy ingot, melting, holding, casting, inspecting, reclaiming scrap metal and reject castings—delivering only the finished casting to the production line. Obviously the savings realized are spectacular.

**LINDBERG-Fisher MELTING FURNACES**

**Lindberg Engineering Co., 2463 W. Hubbard Street, Chicago 12, Illinois**

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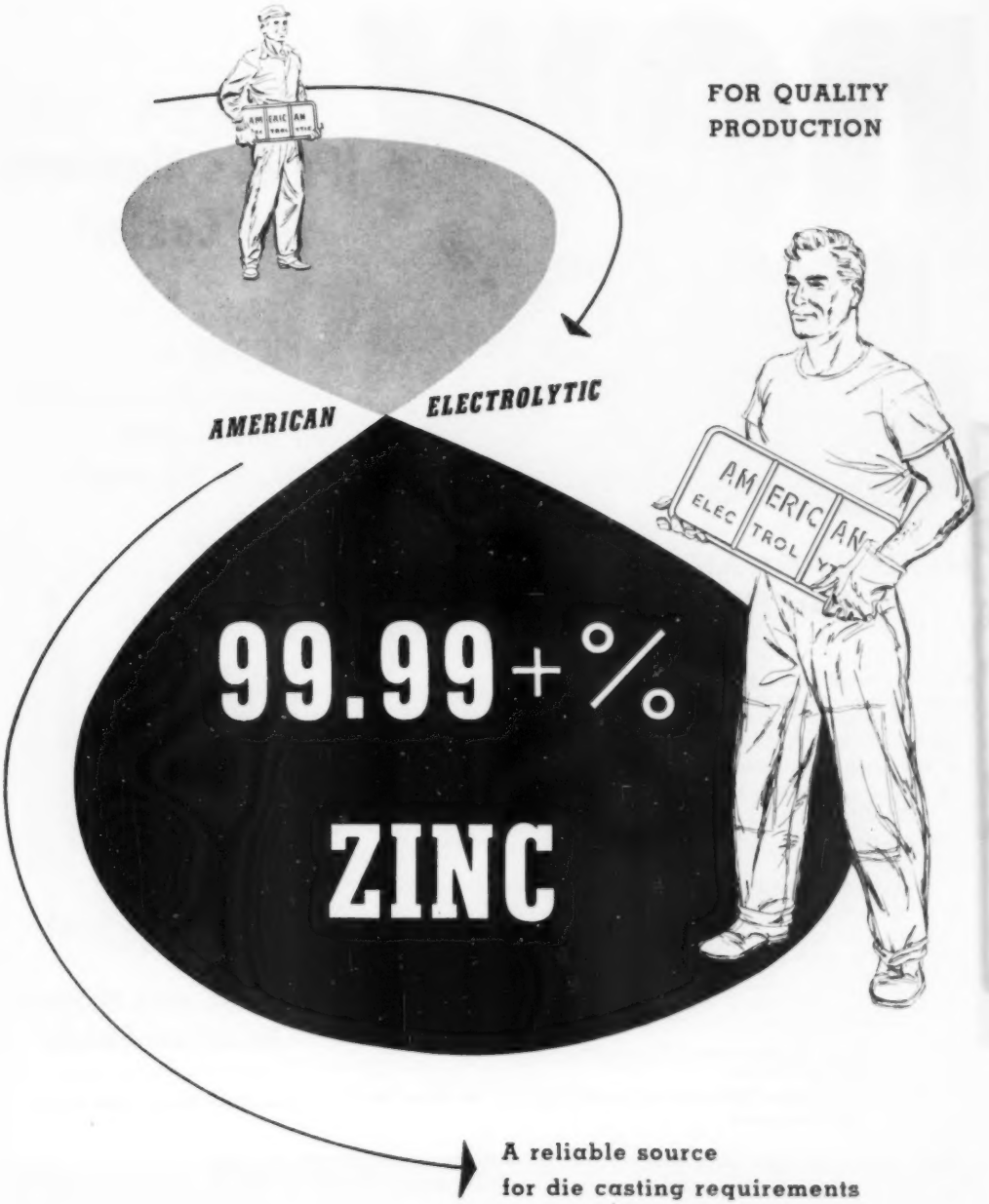


**AMERICAN ZINC SALES COMPANY**

Distributors for

**American Zinc, Lead & Smelting Company**

Columbus, Ohio • Chicago • St. Louis • New York

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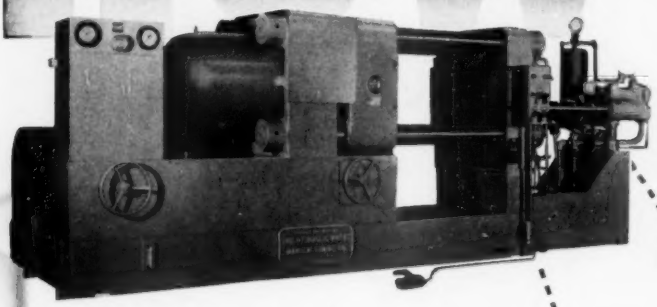
# new

## H-P-M's Aluminum *Die Caster!*

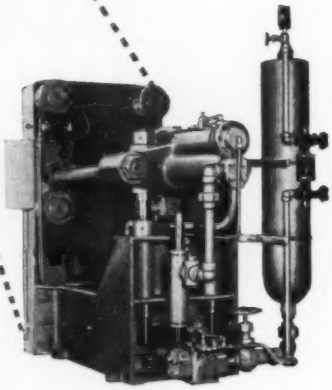


**with Built-In Nitrogen Accumulator for INCREASED INJECTION SPEED!**

**for ALL-HYDRAULIC HIGH PRODUCTION of PRECISION PARTS . . .**

Here's a brand new, high-speed die casting machine for making large aluminum castings up to 12 lbs. in weight. Listed below are just a few of the H-P-M design features which make this new die caster second to none:

- High-speed plunger advance . . . up to 400 ft. per minute.
- Positive, instantaneous injection pressure build-up . . . no pre-fill valve to close.
- Maximum injection pressure when die is filled . . . no drop off of pressure.
- Built-in hydraulic ejectors save time, greatly reduce die costs and minimize operator fatigue.
- Rugged straight-line "All-Hydraulic" die clamp with few moving parts, assure positive die alignment . . . die change-over is simple and fast.
- Dual hydro-electric safety devices guard against premature injection.
- Plenty of space around die mounting surfaces for installation of core pull cylinders.
- Independent handwheel adjustments for both die clamp and injection pressures.



**400 ft. per Minute *Injection Speed***

*Write for catalog 5106, today.*

**SPECIFICATIONS MODEL 400-A**

| SIZE OF DIE PLATES | SPACE BETWEEN BARS | DIE OPENS | MAXIMUM DIE SPACE | CAPACITY PER SHOT (LBS.) | NET WT. (LBS.) |
|---|---|---|---|---|---|
| 38"x38" | 23"x23" | 16" | 42" | 2.2 To 12.2 (Al)* | 40,000 |

*Note: The model 400-A handles brass and magnesium die casting as well. Complete specifications on request.

HPM

**THE HYDRAULIC PRESS MFG. CO., 1094 Marion Road, Mount Gilead, Ohio**

*Revolutionizing Production with Hydraulics Since 1877*

**HYDRAULIC MACHINERY • PUMPS • VALVES • MOTORS**

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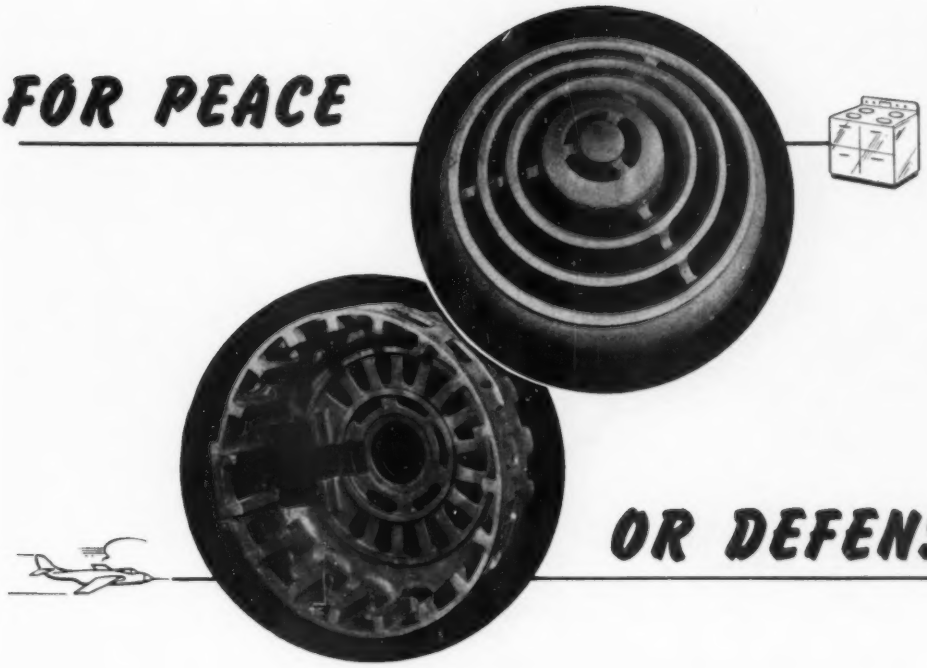
FOR PEACE



OR DEFENSE

# ACME HAS THE EXPERIENCE

ALTHOUGH the bulk of Acme's production during recent years has consisted of peacetime products, much of it for the appliance manufacturers, we have never discontinued defense production.

During all this period, both during and since World War II, we have been continuously producing precision castings for aircraft, and for numerous complicated ordnance parts.

ACME OF CHICAGO offers a complete casting service — for aluminum alloy permanent mold and semi permanent mold castings and aluminum and magnesium alloy sand castings.

Acme engineers will work with you on problems of design, cost of producing samples, production costs, and cost of patterns or permanent molds to produce high quality castings.

ACME

ALUMINUM FOUNDRY CO.
6841 SOUTH BELL AVENUE
CHICAGO 36, ILLINOIS
TELEPHONE — PROSPECT 6-5035

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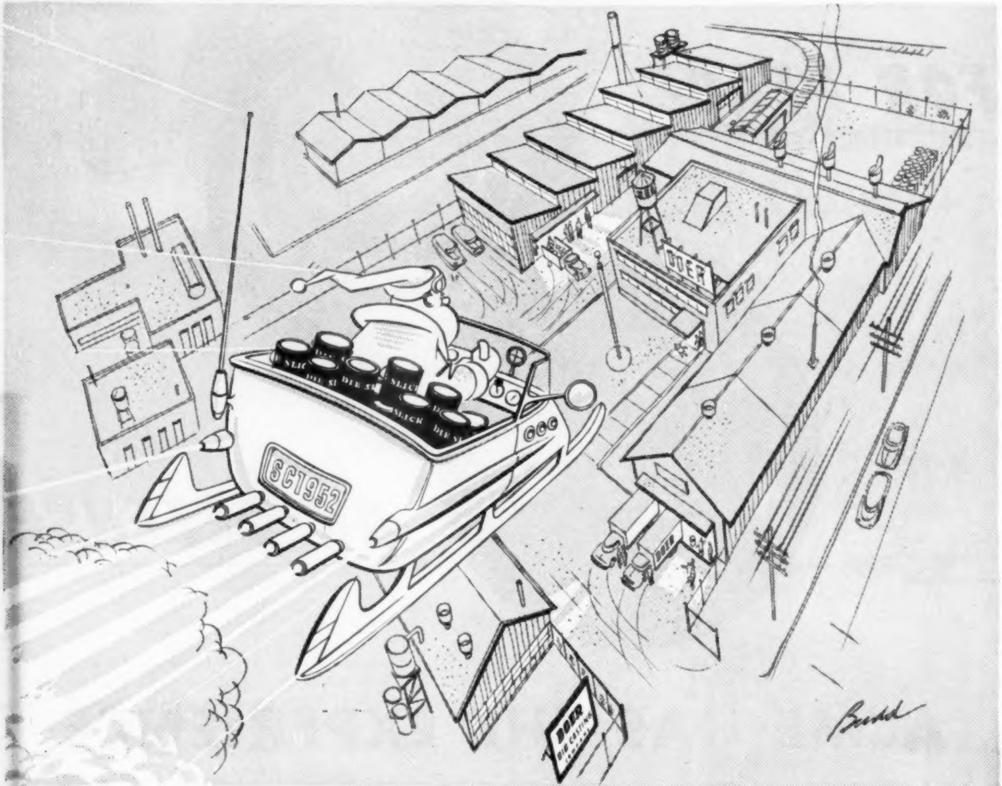


# TWAS THE NIGHT BEFORE CHRISTMAS, AND ALL THRU THE SHOP..

Not a casting was stirring; production had stopped.
Then suddenly there appeared in a fiery display,
Jolly old Santa, in his jet propelled sleigh.

He called to the foreman standing there in the murk,
"It's your own homemade mixes that foul up your work!"
Then he reached in his bag, and said "Here's the trick!
A real gift to die casters—that's famous DIE SLICK."

"Fumeless and odorless, it's sweeping the nation.
9 to 12 cycles with just one application.
*Five* different grades that will spray on real fast—
For zinc or aluminum, magnesium or brass!"

"It cleans up the castings, won't discolor or mar . . .
Try it out, Boys. There's no better by far!"
So the boys sprayed it on, and with greatest of ease,
The castings came out just as slick as you please.

1. Dip blow pipe in Die Slick
2. Spray sparingly over die cavity face
3. Spray on ejector mechanism

# DIE SLICK®

***the industry's standard die lubricant***

Try out a gallon—what can you lose?
No sticking, non-staining, so easy to use!
Don't wait for Santa—make your own test,
We'll cancel the invoice if DIE SLICK's not best.

G. W. SMITH & SONS INC. • 5403 KEMP ROAD • DAYTON, OHIO

SOLE IMPORTER FOR GREAT BRITAIN: W. H. HOOKER, LTD., 4 MIDLAND CRESCENT, FINCHLEY ROAD, LONDON N. W. 3

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# In Production for...

# PEACE or DEFENSE

## Precision Die Castings Solve Your Production Problems

WHETHER it's parts for automobiles, washers, typewriters, refrigerators, heaters or any of the hundreds of other peacetime products, or — parts for tanks, planes, guns or other implements of defense, Precision has the superior know-how, experience and facilities for solving your production problems with the best die castings you can buy. Precision has a wealth of experience in applying die castings to defense material. This experience is available to you now. What is your problem — peacetime or defense production? Whatever your problem, we would like to work with you.

Better DIE CASTING IN ALUMINUM MAGNESIUM AND ZINC

**Call a PRECISION Engineer, Today!**

*Since 1909 the name "PRECISION" has been the symbol of highest quality in the die casting industry

**PRECISION CASTINGS CO., Inc.**
212 Walnut St., Fayetteville, N. Y.
Syracuse, N. Y. · Cleveland, O. · Kalamazoo, Mich. · Chicago, Ill.
British Affiliation — Wolverhampton Die Casting Co., Wolverhampton, England

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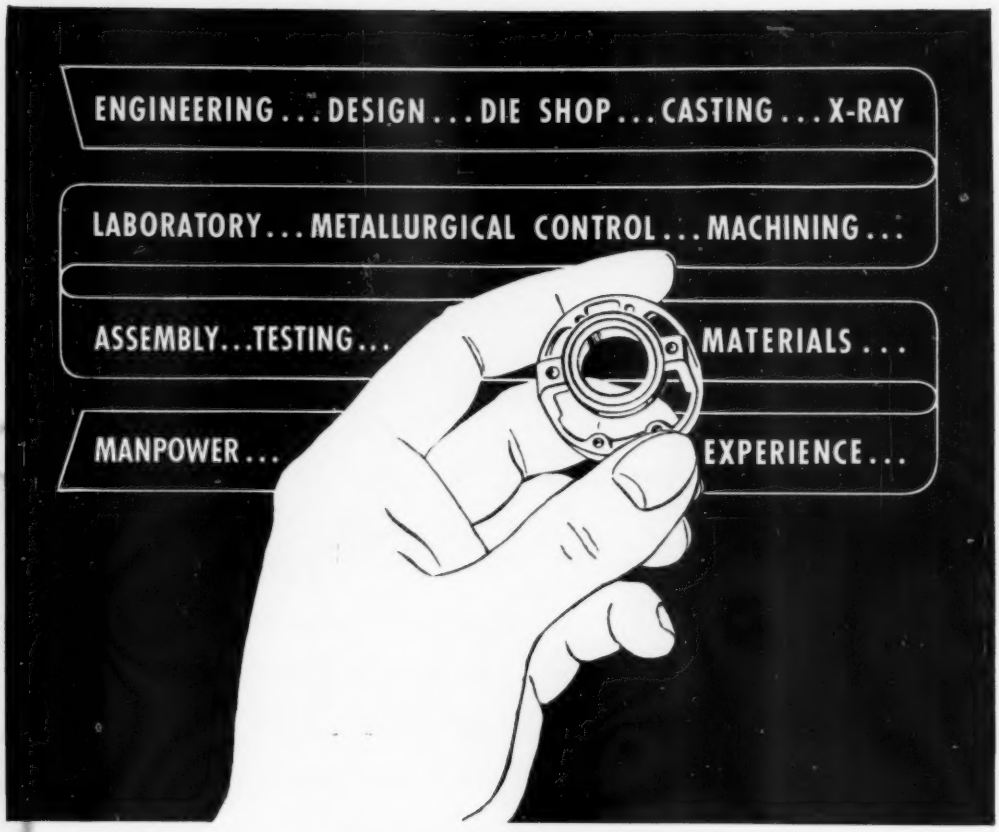

ENGINEERING . . . DESIGN . . . DIE SHOP . . . CASTING . . . X-RAY
LABORATORY . . . METALLURGICAL CONTROL . . . MACHINING . . .
ASSEMBLY . . . TESTING . . .
MATERIALS . . .
MANPOWER . . .
EXPERIENCE . . .

# HOOVER

## *has what it takes to do the job*

Hoover, leader in the vacuum cleaner field, has been manufacturing die castings ever since 1922. Hoover experience in this field is broad. In the past several years it has been greatly increased, due to the demands of defense.

Hoover facilities for the manufacture of die castings are exceptionally complete. They include an experienced engineering staff, skilled craftsmen, completely equipped die shop, machine shop and extensive chemical, metallurgical and X-ray laboratories.

As a result, an ever-increasing number of companies are placing their die casting requirements in the experienced hands of Hoover men.

If you need help in this direction, send your problems to Hoover or ask a Hoover sales engineer to call.

HOOVER

HOOVER

*Specialists in the field of die castings*

**THE HOOVER COMPANY,** Die Castings Division, North Canton, Ohio

*For additional information circle No. 30 on the Reader Service Card*

# FOR STANDARD PARTS AS WELL AS "SPECIALS"

## costs are slashed by *Investment Casting*

WITHIN the past year, the Reeves Instrument Corporation, a subsidiary of Claude Neon, Inc., has investigated and started using investment castings for several small components in its production of aircraft instruments and ordnance devices.

At least three such parts are now in full scale production, several others are being tooled up, while more are being studied to determine whether the quantities required and the amount of machining saved make investment casting more economical than present methods of fabrication.

Each type of part now being so-produced falls into a different category and is cast in a different alloy. In each instance, there has been a substantial saving due to elimination of high-cost machining operations.

The high accuracy parts produced from wax patterns by the Jelrus Co. Inc., are described below.

---

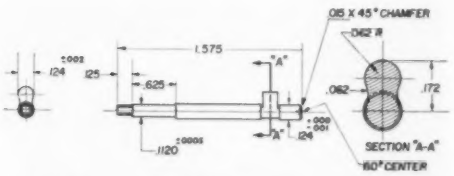
### *Investment casting eliminates tie-up of machines to save 75 percent on cost*

*The Part:* a small cam shaft, properly identified as a gyro type adjusting pin, about 1½ inches long.

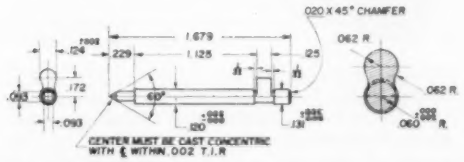
*Material:* 18-8 stainless steel.

*Quantities:* lots of about 2,000.

*Previous method:* machined from ½ inch stainless bar stock. Two lathe operations to cut shaft diameters; straddle milling the square end in two passes; milling the cam lug with a form cutter; burring; two rough grinding and two finish grinding operations on principal shaft diameters; two grinding operations to cut off ends to finish length; burring. Four inspections are included at various stages of the machining. Total machine time—1 hour.




**AS MACHINED FROM BAR** approximately one hour of machine time was required to achieve dimensions shown on drawing **above**, starting with half-inch bar stock.




**AS INVESTMENT CAST,** the dimensions indicated **above** are obtained, requiring only 15 minutes machine time to finish them to dimensions shown in top drawing.

*Investment casting:* cost reduced from approximately $5 to $1.25 per piece. Only secondary operations are to grind two diameters and mill off the center cast onto the square end.

Investment casting saves metal formerly lost in chips due to extensive machining; eliminates problem of low tool life resulting from heavy cuts in stainless bar.

A difficult grinding job of blending the two shaft diameters into the base of the cam lug has been sidestepped by providing a smaller diameter at the base of the lug. When the shaft diameters are ground, they blend more smoothly without the necessity of working all the way to the lug.

## *Standard parts produced in large quantities are sometimes cheaper as investment castings*

*The part:* a gear clamp, one of a large line of standard parts which Reeves Instrument Corp. manufactures for the aircraft instrument industry. Produced in four standard sizes—7/32, ¼, 5/16 and ⅜ inch bore diameters.

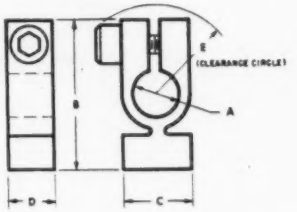
*Material:* SAE 1020 steel.

*Quantities:* 10,000 per month.

*Previous method:* Cut from solid with a series of drilling, contour milling and slitting operations. Only close dimension is the bore diameter.

*Investment casting:* now cast complete except for finishing the bore diameter to size. This important saving on machine time and materials has resulted in consideration of other items in Reeves' standard catalog for production by investment casting.

One minor change in design was required for the casting. The narrow neck between the hub and the base has been thickened by about 1/16 inch and, since it is important to maintain equal weight at top and bottom, an equivalent amount of stock has been removed from the base. The thicker neck improves the castability of this small piece.




| | A | B | C | D | E |
|---|---|---|---|---|---|
| SP862 | .217<br>.218 | 45/64 | 3/16 | .200<br>.205 | 7/8 |
| SP172 | .248<br>.249 | 13/16 | 3/8 | .240<br>.245 | 1 1/64 |
| SP130 | .313<br>.314 | 13/16 | 7/16 | .240<br>.245 | 1 1/8 |
| SP131 | .373<br>.374 | 29/32 | 1/2 | .240<br>.245 | 1 1/4 |

LONG PRODUCTION RUNS are often most economical as investment castings, as shown by the gear clamp, diagram of which is shown **above**, together with a tabulation of dimensions for the four sizes in which it is produced.

## *Greater uniformity results when investment casting replaces large-scale machining*

*The part:* thermostat mounting base which holds a small thermostat and a control switch.

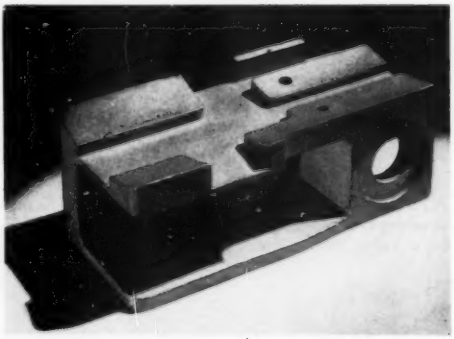
*Material:* aluminum alloy No. 356. (aluminum-silicon-magnesium).

*Previous method:* hogged from the solid in three parts and assembled, requiring extensive machining and numerous inspections, including the cutting of a radius on the entire lower surface. Large stock loss resulted, and almost two hours machining time was consumed.

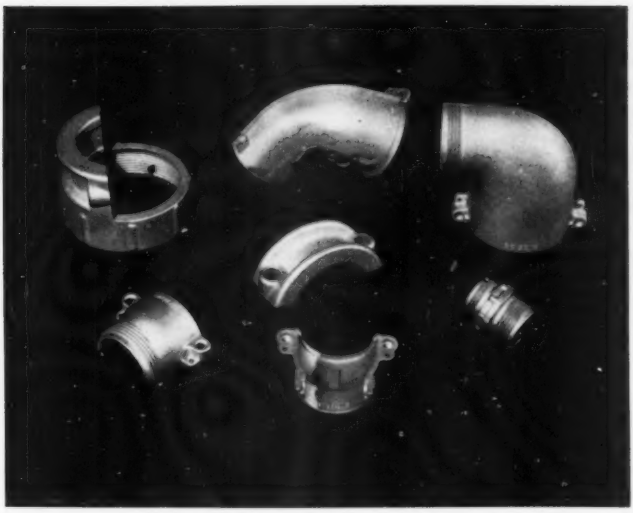
*Investment casting:* cast close to finish dimensions so that a total of 15 minutes machine time is needed. Benefit of uniformity is obtained by investment casting by eliminating the element of human error, once pattern is finished. Cumulative tolerances on multiple machining are no longer a problem. Elimination of 11 machining operations has brought a saving of more than 52 per cent.

Both tool designing and production inspection are simplified. Investment caster is holding important hole diameters closer than required on center distances, meeting a tolerance of ± .001 which is not guaranteed.

The housing is clear anodized before assembly.



INSTEAD OF MACHINING THREE PARTS and assembling them into this complex little thermostat housing, Reeves has it investment cast in aluminum, eliminating 11 machining operations.



1. WET ABRASIVE BLAST gives a satin smooth surface to the many thousands of small aluminum die cast electrical fittings in the Amphenol line, of which the seven pieces **above** are typical. Abrasive blast is followed either by clear lacquer or olive drab enamel, as specified.

2. CAST IN TWO HALVES, this angle plug has mating threads cast very accurately. Sometimes threads are cast complete, as on the small fitting, ***lower right*** in Figure 1.

3. IN A TYPICAL ASSEMBLY, **above**, five aluminum die castings compose the major electrical fittings.

## Does your line have 9000 items in it? Here's one company that benefits from

# SIMPLIFIED PRODUCTION SCHEDULING

## of small metal parts with *Die Casting*

*WITH about 1,200 different electrical connectors to produce, stock and distribute, American Phenolic Corporation of Chicago has a major task of keeping snarls out of its tooling, inventory and inspection. In fact, even this large group of connectors represents only a fraction of the company's entire line of electrical parts, listed at about 9,000 items.*

*For this reason, wherever possible, American Phenolic has used the die casting process to simplify its enormous job. True, less than half of the company's small electrical connectors and fittings can be die cast—a large part of the production being turned on screw machines—but those pieces having projections, surface irregularities or shapes which do not lend themselves to forming with the rotary motion of a screw machine, are most economically die cast.*

•

Even an external screw thread can sometimes be obtained more economically by die casting than by screw machine, especially when the thread is combined on a piece having other conformations that would require individual machine time if cut from the solid.

The die caster has done an expert job of mating his die halves, with the result that where external threads

are cast, they can be used without chasing and little or no flash removal.

Some external threads, as in the angle plug with split shell shown in Figure 2, are cast on two mating halves of a pair of die castings so that when the right and left sides of the connector are assembled, a closely matched screw thread is produced. This also calls for a high degree of precision in tooling so that mating halves produced from different cavities and at different times will fit together.

The internal threads are, of course, all machined, but on the majority of die cast fittings, this is the only machining operation required.

Paragon Die Casting Company of Chicago, produces these small pieces in an aluminum alloy. Wall thicknesses average about 3/64".

The majority of electrical connectors manufactured under the Amphenol trademark, are for use in aircraft and military applications. Government specifications are close, and not only must fittings be interchangeable, but must also mate with standard fittings of other manufacturers. Class 2 threads are called for throughout.

This being somewhat closer than is desirable for best die casting practice, Amphenol engineers have worked with the die caster on the problem. The greatest latitude is allowed on the die cast threads, and tolerances on the mating screw machine threads are tightened, since machine shop tolerances are normally closer than those possible by any casting method.

The die casting process permits certain tooling economies, even though initial tool costs are sometimes regarded as a deterrent.

For example, for parts having similar size and shape, it is entirely practical to use interchangeable plugs in the die. That way, the major cost of the die block can be spread out, and many different parts produced, yet only a relatively small expenditure for plugs to form the various cavities is required.

When inventory requirements permit, it is also regarded as good practice to include two or more cavities in the same die so that a number of identical or related parts can be produced simultaneously.

The use of die castings, purchased from an outside supplier, also helps in the scheduling problem, since this relieves in-plant operations, saves the maintenance of excessive inventories and makes possible the use of floor space and machines for other work.

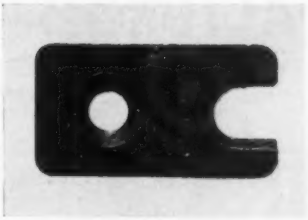
Finish is regarded as an essential consideration by American Phenolic, and all of these parts are given an attractive matte surface by a wet blast operation on a production basis. The parts may also be given a coat of clear lacquer or an olive drab enamel, depending upon customer specifications, and then baked. Some connectors are clear anodized.

## *Aluminum gives needed physical properties*

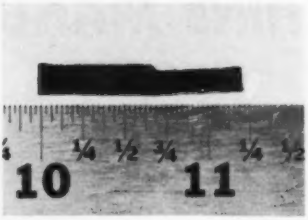
Weight, always at a premium in aircraft, is carefully watched on every component that is intended for the airplane industry. Even for such small parts as

continued on page 71

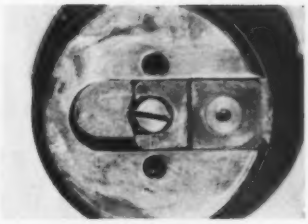
MATING WITH SCREW MACHINE and plastic parts in their own line, and with those of other manufacturers, is essential, and calls for closest tooling control and inspection.



AS SINTERED . . . . .
Molded of iron-copper powders to 85 percent theoretical density, this piece is designed to act as a spring action retainer for the firing pin.




THEN BENT . . . . .
Before hardening to Rockwell C 60, the sintered piece is bent 4 degrees so that, in assembly, it can be pulled flat to gain spring action.



. . . . . AND ASSEMBLED
When screwed into position in the firing pin assembly, the powder metal part holds the firing pin securely against vibration-loosening.

## POWDER METAL LOCKING PART is bent 4 deg. and

# ASSEMBLED UNDER STRESS

### to gain spring action

By A. L. FABENS
General Manager
Stemco Corp.

SPEEDING up industrial construction and lowering cost is one of the self-appointed tasks of Ramset Fasteners, Inc. Through the use of a powder-actuated tool, a wide variety of drive pins and other fastening devices are quickly installed even in the hard-to-reach places.

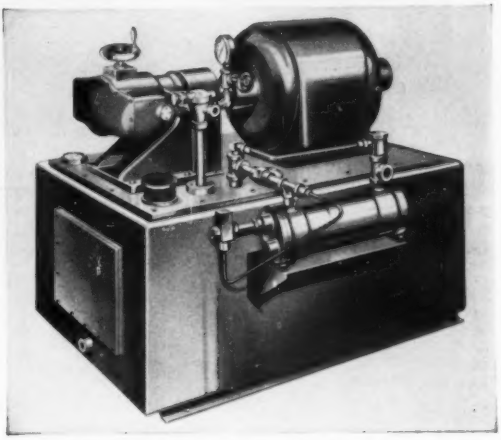
A part molded from metal powders by the Metal Powder Products Co. of Dayton, Ohio is a lock for the firing pin on the .38 calibre Ramset tool. Basically an iron-copper part having a density of 85 percent of theoretical, the part is unique in several aspects.

When a powder part is considered for a structural section, design generally dictates that the stresses be kept as low as possible. The designer further avoids the use of molded powder parts where they are subject to impact or fatigue resulting from a vibrational loading. In the Ramset tool all of these customary "don'ts" are circumvented thus far with impunity. After molding and sintering as a flat section, the lock is bent 4 degrees from the horizontal in the coining operation.

In addition to bending the lock, the coining operation

DRIVES STUDS INTO
STEEL, MASONRY OR WOOD

# MORE MACHINE MANUFACTURERS INSTALL MARVEL SYNCLINAL FILTERS AS ORIGINAL EQUIPMENT

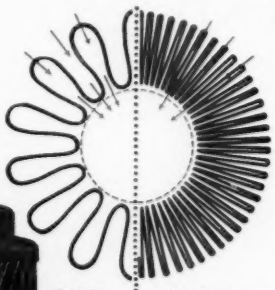


Large series hydraulic pumping unit manufactured by The Denison Engineering Co., Columbus, Ohio to recommendations of the Joint Industrial Conference. These pumping units are equipped with Marvel Synclinal Filters.

## They Know That ONLY ACTIVE FILTER AREA COUNTS!

It isn't the total amount of filtering mesh that may be squeezed into a filter unit but the amount of ACTIVE, WORKING filter mesh that counts. Surplus mesh not only fails to filter, but obstructs the passage and slows the flow. A too crowded unit does not have adequate space for storage of accumulated foreign matter — tightly packed pleats of mesh can soon become clogged with filtered out material. Marvel Synclinal Filters are balanced to provide maximum mesh area for all the liquid which can pass through the space and allow necessary room for filtered out material. That is why they excel in maintaining efficiency through longer periods between cleanings. Not only is the frequency of cleaning reduced, but disassembly, cleaning and reassembly is so simple that ordinary workmen can do it quickly.

Line Type (cutaway)



Sump Type (cutaway)

Meets J.I.C. Standards

### FACTS — NOT CLAIMS

"Campaign promise" claims mean little to engineers. They want the record, measurable facts. That is why over

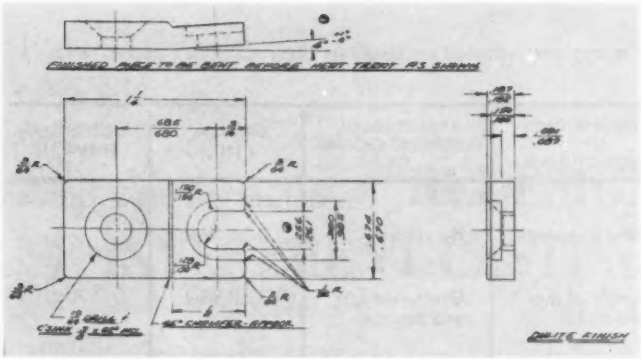
**240 MANUFACTURERS have picked MARVEL SYNCLINAL FILTERS AS THEIR O.E.M. CHOICE**

Sump and line models available in capacities from 5 to 100 g.p.m. Mesh sizes from 30 to 200. All models operate in any position. Line models may be serviced without disturbing pipe connections. For efficient filtration of non-corrosive liquids in hydraulic and low pressure systems, Marvel has your answer.

*For complete engineering data write for catalog 105.*

**MARVEL ENGINEERING COMPANY**
625 W. Jackson Blvd. Chicago 6, Ill.

*For additional information circle No. 38 on the Reader Service Card*



DIMENSIONS ARE SO CLOSE on this small metal powder piece that coining is required after sintering to achieve tolerances as close as ± .001. This piece was previously machined from a rolled section.

POWDER-ACTUATED tool drives studs, speeding construction and lowering costs, as indicated in inset, **below.**

is required to meet the rather precise tolerances that are required on the part. Figure 3 shows that dimensionally the part is held much more closely than is customary in powder parts, several tolerances being only ± 0.001. As a final step, before hardening, the counter-bore is cut.

In the Ramset tool, the firing pin assembly screws into the breach. During operation the severe pounding that the pin takes due to recoil normally causes the pin assembly to loosen. Not only is there a tendency for the firing pin to unscrew, but even slight movement due to play in the threads can cause failure of the tool. The molded powder firing pin lock prevents any loosening of the firing pin.

To do this job, the lock is molded as described above and then hardened to about 60 Rockwell "C". When put into use in the tool, the 4 degree bend is pulled flat. Due to the spring action given by the hardening operation, the lock acts as a spring washer effectively holding the firing pin assembly rigidly in place and thus preventing unscrewing due to shock or vibration.

This part made from metal powders is unique since it requires properties that are generally considered to be the least satisfactory characteristic of molded powder parts.

The basic reason, of course, for converting from a wrought steel lock to one made of metal powders is cost. The lock was formerly made from a rolled section that was machined to the desired shape. As made from metal powder, the cost of the lock is 50 percent of the cost of the machined piece.

Impressive as the cost reduction is, the 50 percent is only a part of the story. From the point of view of the producer of parts from iron powder, this lock represents a very short run piece. In other words, the die costs have to be amortized over a relatively small number of pieces. If it were possible to utilize the dies to secure their maximum life, the cost of the lock would be about 10 percent the cost of the machined counterpart. Such a saving (90 percent) is not unusual when powder metallurgy products are substituted for machined parts.

The final operation on the firing pin lock before assembly is to form a black iron oxide surface by the Dulite process as a means of inhibiting corrosion and enhancing the appearance of the assembly.

## *A quick way to fasten into steel, masonry or wood*

The Ramset tool, literally shoots a stud into or through steel, masonry and wood. The propellant —either of two types of specially loaded cartridges with the stud to be anchored used in place of the projectile — does the job.

Outstanding savings in construction costs are reported by the users of the tool. Typical of these savings are:

| *Operation* | *Old Method* | *Ramset Method* |
|---|---|---|
| Anchor ductstraps in concrete slab floor or steel beams | 37 min. $1.75 | 1 min. $.23 |
| Anchor pipe hangers to concrete floor beams | 59 min. $2.78 | 0.7 min. $.243 |
| Anchor bridle rings to concrete ceiling | 9 min. $0.50 | 1 min. $.36 |

(Note: Costs include labor and materials)

*Why Warner and Swasey use many investment castings in their weaving machines:*

| FIGURE | NAME OF PART | PREVIOUS METHOD OF MANUFACTURING | ADVANTAGE OF INVESTMENT CASTING (1) | MATERIAL (2) | COST DIFFERENTIAL (3) |
|---|---|---|---|---|---|
| 1 | Shuttle | Welded stampings | No cracking | Solar Steel | ------ |
| 3b | Shuttle opener | Assembly of machined parts | Greater strength and accuracy | Airdi Steel | —30% |
| 3c | Shuttle opener | Machined from bar stock | Greater accuracy | KW | —30% |
| 4 | Tucking needle | Forging | Corrosion resistance | Beryllium nickel | ------ |
| 5 | Shuttle Pusher | Pressed formed steel | No cracking | Solar Steel | Greater for Inv. Cast. |
| 6 | Shuttle lifter | Forging and machine parts | Eliminates assembly | Airdi Steel | —82% |
| 7 | Guides | Machined from bar stock | Wear resistance | Beryllium copper | ------ |
| 8 | Expeller | Forgings and machined pins | Better design possible | Airdi Steel | ------ |
| 9a | Pawl | Stampings riveted together | Frees men and machines | Airdi Steel | none |
| 9b | Filling end gripper | Machined from stock | Better design possible | SAE 4615 | ------ |
| 9c | Slide block | Stamping and tubing, riveted | More rigid, better design | Airdi Steel | +5% |
| 9d | Gripper cam | Machined from bar stock | ------ | Airdi Steel | —20% |
| 9e | Shuttle feeder slide | Machined from stock | ------ | Airdi Steel | —40% |

(1) Does not include cost reduction if any.

(2) Solar steel from Carpenter Steel Co., Airdi steel from Crucible Steel Co., KW steel from Carpenter Steel Co., Beryllium copper and beryllium nickel from Beryllium Corp. of America.

(3) + indicates increased cost for investment casting.
— indicates decreased cost for investment casting.

# Special weaving machine REDESIGNED TO USE INVESTMENT CASTINGS

WHEN the Warner and Swasey Co. started redesign of the Sulzer Weaving Machine for cost reduction purposes, they called in the engineers of Precision Metalsmiths, of Cleveland to determine which parts or combination of parts could be made by investment casting.

A survey disclosed that a number of parts or assemblies could be made economically by investment casting. Cooperative development work by the two companies has resulted in the adoption of many castings.

At the outset, it was not known what metals would be best for each particular piece so that the development program had to investigate not only design but also materials. As many as eight different alloys were tried on some parts before final selection was made.

The present Warner and Swasey-Sulzer weaving machine has been in successful operation in commercial installations for over two years. In this time no particular difficulties or troubles have developed.

Operating at speeds far greater than the conventional loom, the new weaver is able to produce about twice as much cloth of any given weight or weave as the older machines. Further, with this weaver one operator is able to tend to from 15 to 20 machines.

A weaving machine must operate at high speeds with high precision. The parts are subjected to sudden starting and stopping as well as shock loadings. These requirements point to the use of high strength materials, machined to close tolerances so that the machine will operate smoothly and continuously.

Obviously, if a high degree of machining skill is required to secure the desired fits, then the amount of machining stock to be removed must be held at a minimum to lower machining costs. This is one of the reasons for the use of investment castings, where the "rough" castings are held to close dimensional tolerances so that a minimum of machining is required.

Where a part can be made as a single intricate casting instead of an assembly of machined parts not only is the cost generally reduced, but the weight may often be considerably less. This may be an important consideration in some pieces.

Bearing in mind these generalizations, it will be well to consider some of the investment casting used in the Warner and Swasey-Sulzer weaving machine.

continued on next page

# *Thin welded stampings replaced with investment cast rectangular tube*

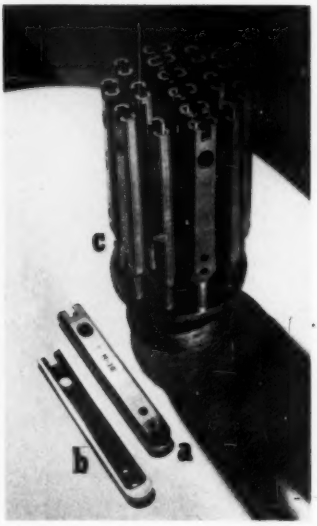



FIGURE 1

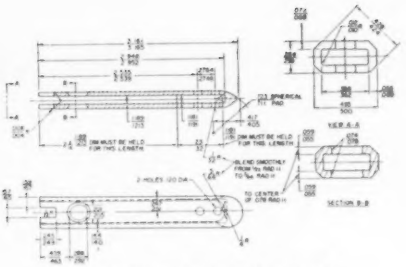


FIGURE 2a. CASTING DRAWING

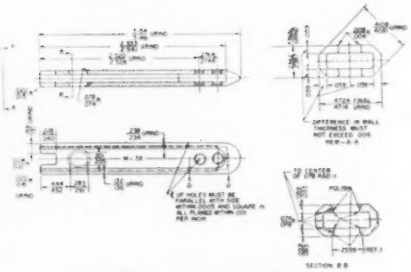


FIGURE 2b. MACHINING DRAWING

*One of the major differences between the Warner and Swasey-Sulzer weaving machine and a standard loom is the design of and operation of the shuttle. In a conventional loom the shuttle is relatively large, 1½ x 2 x 18 inches. In the weaving machine the shuttle is ¼ x ⅜ x 3 inches.*

*Where the loom shuttle carries a bobbin and only one shuttle is used at a time, the weaving machine uses a plurality (up to 13) shuttles and carries no bobbin. Instead, the shuttle picks up the filler thread at the start of a cycle, carries it across the warp and then drops the thread. The shuttle is then dropped onto a conveyor below the weaving level of the machine and is carried back to the starting position.*

*The present design of the shuttle is shown in Figure 1. The complete shuttle is shown at Figure 1a and a longitudinal section, Figure 1b. As originally designed by Warner and Swasey the shuttle was made of three parts: two relatively thin walled stampings which were welded together along a longitudinal seam to form the roughly rectangular tube and a solid tip section. After the welds were machined to finished dimensions it was found that the wall was so thin that cracking almost invariably occurred at or adjacent to a weld. As redesigned the shuttle is a single casting.*

*Figure 1c is a "tree" of castings as produced at present out of Solar steel, later hardened to 54-58 Rockwell C.*

*Both accuracy of size and surface finish are important in this part. In the as-cast condition the shuttles are held to exceptionally close tolerances. A comparison of drawings a and b in Figure 2 shows both the casting drawing and the machining drawings. These are typical of all of the investment castings used in the weaving machine.*

*The shuttle shown in Figure 1a is complete except for a spring actuated thread gripper. This device fits into the hollow portion of the shuttle body and is designed to pick-up the filler thread at one end of the pass and drop it at the other. To do this job the jaws of the gripper must be opened to receive the thread and again to drop it. Co-operating with the shuttle, therefore, are two shuttle openers.*

## *Screw machine piece plus forging give way to a one-piece design via investment casting*

*The original shuttle opener used on one end of the weaver is shown in Figure 3a. As can be seen, it consisted of a forging, a screw machine part, and a pin to hold the other two pieces together. This assemblage of parts was expensive to make. As redesigned the opener is a single investment casting of Airdi steel, hardened to 60-64 Rockwell C. This redesigned opener is shown in Figure 3b.*

*The other shuttle opener is shown in Figure 3c. This part was also originally a machined piece that was bent to shape after machining. As fabricated it was difficult to secure uniformly bent openers resulting in mal-operation of the weaver. At present this opener is investment cast so that it need only be polished and sized. Made in Carpenter KW steel, it is hardened to 62-65 Rockwell C.*

FIGURE 3

*Both shuttle openers when redesigned showed from 30 to 40 percent lower manufacturing cost for a part that functioned more reliably than the more expensive predecessor.*

## *Corrosion resistant beryllium nickel used for fine detail*

*At each side of the cloth being woven there must be a selvage. Formation of the selvage is accomplished by taking a short length of the piece of filler thread that has just been placed and doubling it back a short distance into the warp. This, in effect, gives a double thread at each side of the cloth to form the selvage.*

*The device used to form the selvage is the so-called tucking needle. After the shuttle has made a single pass through the warp, the thread is cut off on both ends. The tucking needle then pulls the short end of thread back into the warp. On each machine, two needles are needed, a left and a right hand one. Further, these needles will vary as to tip design depending upon the thread to be handled. They must be made of corrosion resistant material to avoid staining and snagging the thread and must be hard and smooth for maximum wear.*

*The first tucking needles were made of forgings. This was replaced when the machine was redesigned with an investment cast beryllium copper needle.*

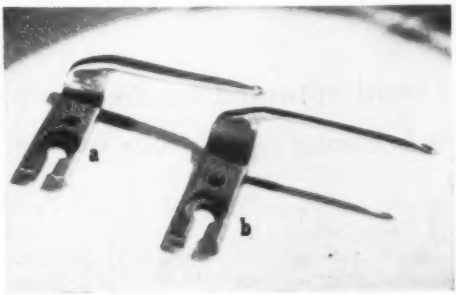



FIGURE 4

*Later a beryllium nickel needle was found to be superior since it is completely resistant to atmospheric corrosion and can be polished to the high degree required.*

*As produced the beryllium nickel needles are polished and sized after being hardened to 46-50 Rockwell C. These tucking needles are shown in Figure 4.*

## *Costlier investment casting replaces stamping to gain reliability*

*After a shuttle has made a single pass through the warp it must be returned to the starting position without passing through the warp again. On the Sulzer weaver the shuttle is dropped below the weaving level and is carried to the starting side*

continued on page 61

# THREE TYPICAL USES OF DIE CASTINGS

CONSUMER
INDUSTRIAL
MILITARY

CORING OF SLOTS lengthwise and sidewise, plus the forming of extensive surface detail, makes these die cast zinc pieces for ratchet screwdrivers much less expensive than fabrication from brass tube stock.

## Detail obtained by die casting saves machining operations on low cost screwdrivers

THE average householder keeps a few tools on hand for occasional jobs, but he does not need—and would be unwilling to pay for—the heavy duty implements which professional carpenters or industrial users require.

It has therefore been important to build a type of tool which will withstand intermittent, light work around the home or craft shop, but which does not employ expensive materials or machining operations, in order to bring the sales price down to normal retail levels.

North Brothers Mfg. Company, a Division of Stanley Tools, produce an extensive line of tools, some intended strictly for professional use, and others for lighter duty and lower cost.

For example, North Brothers manufacture a complete line of screwdrivers of both rigid and ratchet spiral types. Among these are two models in which zinc alloy die castings have been substituted for heavily machined brass in order to cut costs while ensuring completely adequate service characteristics for casual usage.

The die cast zinc shell shown above is a major structural part in Yankee Handyman screwdrivers model 133H and 233H because it is possible, by this method, to obtain great detail which can otherwise only be accomplished by machining.

It has been possible to core slots both longitudinally and crosswise, and a combination of these. It has also been possible to form integrally four slender ribs which anchor the handle when it is driven into position on the upper end of the shell. Actually, the only portion of this die casting which can be seen in the assembled screwdriver is the rounded bead and the portion of the handle tube between the handle and the ratchet section.

Only machining on this detailed casting is the cutting of internal threads in each end. Otherwise, the part is furnished ready to paint and assemble.

Another, smaller zinc die casting having similar function and detail is used in the low-priced ratchet screwdriver. This very small screwdriver which has a ratchet shifter to permit it to drive or draw screws, is useful for hundreds of home jobs such as repair of appliances, radios, toys, guns, etc. It is sold in the neighborhood of 50 cents, and gets much of its sturdiness and low cost from the small die cast shell. Both of these zinc die castings are produced for North Brothers by the Doehler-Jarvis Corp.

## *Cost advantage favors die cast hub in sheet metal impeller for small blowers*

IN their line of small turbo-blowers and portable commercial vacuum cleaners, the Spencer Turbine Co. of Hartford, Conn., uses an impeller fabricated from sheet metal with a die cast hub.

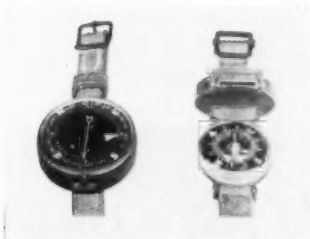
This hub, made by the Aluminum Co. of America, is an aluminum die casting and is made in two styles as shown in the illustration. The smaller hub is fastened to the motor shaft with a single set screw. As furnished by the die caster, this hub is complete except to drill and tap the hole for the set screw and to broach a shallow slot through the bore to remove any burs that might result from the drilling and tapping operation.

On the larger hub, the bolt holes for clamping are drilled after the die casting is received.

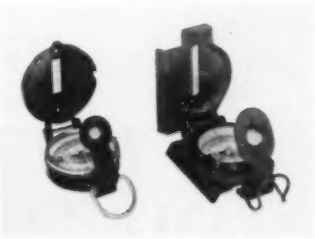
One feature of design interest in both of these hubs is the convex surface on the side away from the clamping boss. In the operation of the turbo-blowers there is a relatively high force developed near the center of the impeller. This necessitates reinforcement of the hub section. The convex face is the design engineer's answer to the need for added strength and rigidity at this point.

Either three or four impellers are used per blower, depending on the number of stages in the unit. By the use of the same sizes of hubs for a multitude of different models, Spencer Turbine has been able to show a reduction of over 50 percent in the cost of the finished die cast hub as compared with the sandcasting formerly used.

## *Two improved Army compasses with die cast housings see action in Korea*



STAMPED . . . . . DIE CAST



STAMPED . . . . . DIE CAST

TWO new induction-damped compasses developed by the U. S. Army Engineers Research and Development Laboratories make important use of aluminum die castings. Already in use in Korea by the armed forces these two compasses represent a marked improvement over the older types formerly issued.

The wrist compass features a smaller diameter thinner construction made possible by the use of a die casting for the case. The strap lugs and cover hinge are cast integrally with the case which is curved to fit more closely the contour of the wrist. The hinge lugs are so cast that they can be used to quickly and easily orient maps with the compass. The dial is graduated to five degrees and can be estimated accurately to two and one half degrees.

Improved construction throughout the compass has been stressed so that it is operable over a wide range of magnetic latitude. The center of gravity has been lowered so as to minimize the effects of changing magnetic dip on the balance of the entire system. An osmium alloy pivot operating on a sapphire vearing has reduced friction materially.

The lensatic compass is housed in

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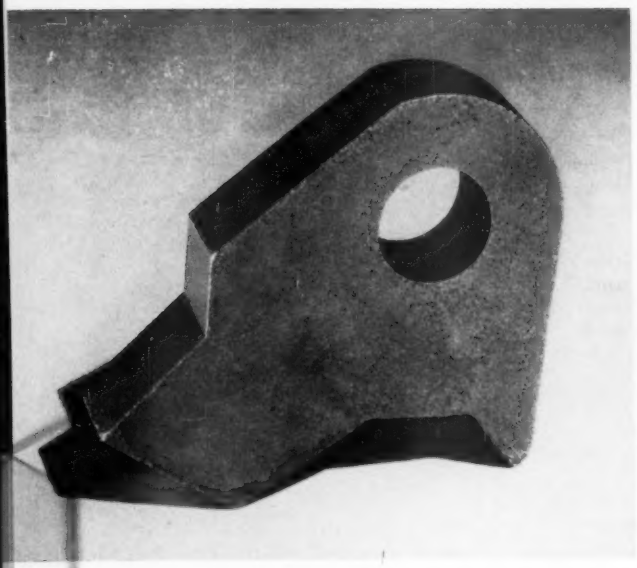
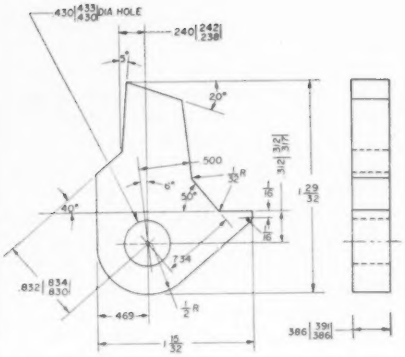
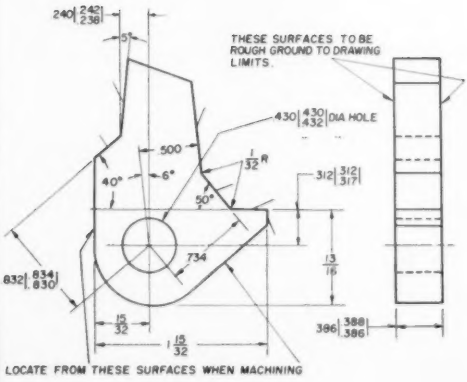





1. REPLACING A CHROME-IRON FORGING, this hammer for a food dispisal unit is produced as a high density powder metal part by use of the infiltration technique plus case carburizing and surface hardening.

2a. AS MACHINED from a rough forging, the dimensions shown at **left** required multiple operations for contour, bore diameter and flatness.

2b. AS PRODUCED BY POWDER METALLURGY, dimensions shown **above** are held. These are dimensions which powder metal fabricator is meeting on production runs.

# STRESS RESISTANCE AND LOW COST

**are built into this food disposal unit by** *Die Casting*

*Powder Metallurgy*

*Permanent Mold Casting*

HIGH impact strength powder metallurgy parts are being used successfully by Westinghouse Electric Corp. as the chopper blades in the Waste-Away food disposal unit. Made by the infiltration process of powder metallurgy these blades have replaced machined forgings of hardened 13 percent chromium iron.

## *High shock loading absorbed by powder metal hammers*

Exceptional among these parts are the impellers shown in Figure 1. These swing hammers are made from iron powder impregnated with copper. Normally parts made from metal powders are classed as having limited shock resistance. Since a waste food disposal unit acts essentially as a hammer mill, the impellers are subject to extremely high shock loadings, particularly when bones and similar material are being ground.

Originally the impellers were made from a 13 percent chrome iron forging, machined and hardened as indicated in Figure 2a. Utilizing this material a hardness of 59 — 62 Rockwell C was requred to secure the physical properties desired.

The present part is made by the infiltration process of powder metallurgy[1]. In this process a skeleton is made from iron powders and infiltrated with molten brass. During the infiltration process, the zinc in the brass evaporates leaving essentially pure copper as a pore filling medium. The piece is molded to its final dimensions and after infiltration needs only to be case carburized to a depth of 0.062 and then surface hardened to 40 — 45 Rockwell C.

The final part as made by infiltration is shown in Figure 2b. Comparison of Figures 2a and 2b shows that the powder part is held to as close tolerances as the one produced by forging and machining.

The impeller made by infiltration, after hardening, has tensile and impact properties that are 80 percent of the physical properties of the hardened forging formerly used.

This particular use of a powder metallurgy part is of significance to the design engineer since it is one of the relatively few commercial applications of such parts where they are subject to loads and stresses of the type encountered in the waste food disposal unit. It is of further interest that the cost of the impeller ready for installation is only one-fifth the cost of the forging it replaced. The impeller is made for Westinghouse by the Presmet Corp., of Worcester, Mass.

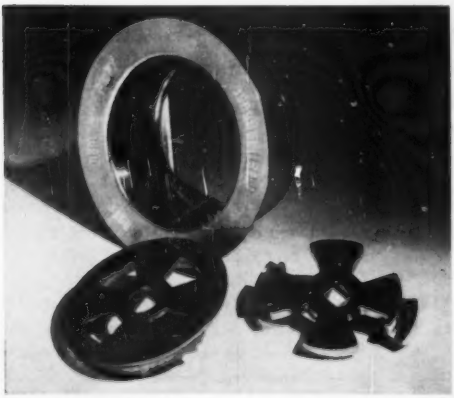
## *Nickel bronze permanent mold castings have good surface*

Because of the severe bending and vibrational stresses and excessive wear, the sink flange, stopper and cam plate, Figure 3 are fabricated as permanent mold bronze

(1) Infiltration Powder Metallurgy by Claus Goetzel — Precision Metal Molding, October, 1951; page 91.

3. NICKEL BRONZE PERMANENT MOLD CASTINGS, **below**, furnish corrosion resistance, high density, shear stress resistance and smooth surface for plating.

4. DIE CAST ZINC, **right**, provides the most economical upper housing for the food disposal unit, having all mounting and positioning elements formed integrally. Weight of this massive casting is nine pounds.



castings. Here again the choice of material is dictated by the service requirements and the method of fabricating by economy.

The sink flange requires a considerable amount of finish machining since it must have its top edge reduced in thickness so as not to form a hump in the sink. The inside bore must match the stopper and cam plate to form a tight seal when it is desired to hold water in the sink and finally the bottom must form a good fit with the body of the Waste-Away to prevent leakage. Since service requirements demand a nickel bronze, permanent mold or sand casting were considered and the lower finished cost of a permanent mold casting dictated its use. This same reasoning led to adoption of permanent mold castings for both the stopper and cam plate.

After finish machining these three castings are chromium plated.

### *Die castings are sound despite heavy sections*

Four die castings complete the list of Precision Metal Moldings on the Waste-Away. The upper housing is a zinc die casting, Figure 4, exceptional in several respects. Physically, it is larger than average and weighs almost nine pounds after finishing. All holes needed for mounting auxiliary parts and for assembling the housing to the sink flange and lower motor housing are cored.

In this single piece there is a change of section thickness of as much as four times. To further complicate the die casting operation some of the heavier sections must be fed through a thin section. In spite of this, sound castings are consistently secured.

As received from the die caster, the Dollin Co., of Irvington, N.J., there is very little finishing to be done on the casting. A few holes have to be tapped and the brass bushing through which the switch rod passes is pressed into place.

Three other zinc die castings are used on the disposal unit. The mounting plate, used as a connecting unit between the disposal unit and the sink

5. IMPORTANT SAVINGS are reported on these three small zinc die castings, due mainly to lowered machining.

is used in the as cast condition except for tapping four mounting holes. The switch lever, actuated by the cam plate described above needs only have one hole for a set screw drilled and tapped. Finally the handle is drilled and tapped for mounting and then polished and chromium plated. These last three die cast parts are shown in Figure 5.

All of the die castings used in this unit represent a marked saving in cost over a sand cast part which they would normally replace. The largest saving coming, of course, by elimination of finish machining operations that would be necessary if a sand casting were used.


Aluminum and Zinc Base
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PARAGON die castings are everything the name implies. Four offices are ready to serve you.

Our plant contains every modern facility to produce die castings which leave nothing to be desired in workmanship, accuracy, appearance and function.

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*For additional information circle No. 53 on the Reader Service Card*

# ALUMINUM DIE CASTING ALLOYS

Aluminum alloys produced under quality controlled methods are specially designed to meet your die cast, permanent mold, or sand casting requirements.

For prompt dependable deliveries of quality aluminum in any quantity, write to

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# ZINC BASE DIE CAST ALLOYS ZAMAK

Complete facilities plus modern production methods enable you to get high quality laboratory controlled zinc alloy to your exact specifications. Users of CERTIFIED receive prompt and dependable service for their requirements.

**Certified Alloys Co.**

BEDFORD, OHIO

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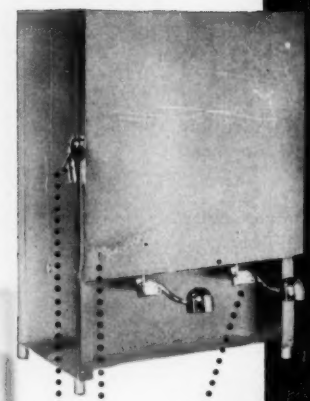
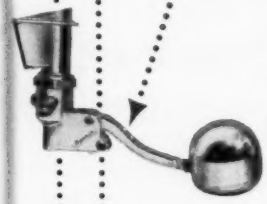
# Here's How

## TWIN CITY CASTINGS CUT PRODUCTION COSTS on the NORRIS MILK DISPENSER VALVE and CABINET HARDWARE





You get *more* than metal in Twin City Castings. Over 30 years of sound, feet-on-the-ground experience has given the Twin City Die Casting Co., the die-making ingenuity and casting know-how that provides a service *plus* . . . so often hard to find in today's business world. Here's an example of what we're talking about:

**THIS WAS THE JOB:**

Produce dies and cast parts for the popular Norris Milk Dispenser that will reduce costs over previous machining methods. Design it to pass strict sanitary codes . . . to be attractive in appearance, practical to the job.

**THIS WAS TWIN CITY'S ANSWER:**

All specifications were met and held. Co-operating with Norris engineers, an easy method of opening the valve was devised to enable restaurant personnel to handle the valve even with hands full. The Norris Milk Dispenser passes sanitary codes with flying colors. AND production costs dropped.

**HERE'S WHAT THIS CAN MEAN TO YOU!**

Twin City's ability and willingness to work with your engineers to cut your final production costs . . . its years of experience and casting know-how can show real profits for your company. Write, let Twin City Engineers demonstrate that *service plus* to you.

**TWIN CITY DIE CASTINGS CO.**

3351 TALMAGE AVE. S.E. · MINNEAPOLIS 14, MINN.

*For additional information circle No. 71 on the Reader Service Card*


3 TYPICAL DIE CASTINGS
continued from page 37

an all die cast case. This compass has a hinged aluminum case aproximately three inches long, two and one quarter inches wide and one inch thick when closed. The weight of the entire compass is less than five ounces. Case hinges are cast integrally with the case halves thus reducing the number of parts and the cost of assembly. Also cast integrally with the case is a five inch graduated straight edge, half on the cover and half on the body.

As in the case of the wrist compass, this lensatic compass has been redesigned to give more accurate performance over a wide range of conditions.

Both compasses can be used over a temperature range of —65 to 125 F, and in storage will stand temperatures of —80 to,160 F. They are shock proof and water proof and resistant to mildew and fungi.

---

## DIVERT ALUMINUM SCRAP TO SECONDARY PRODUCERS

The National Production Authority, U. S. Department of Commerce, has acted to divert the flow of aluminum scrap from primary producers to secondary smelters.

A directive issued by NPA's Aluminum and Magnesium Division, limits the amounts of tolled and purchased scrap and secondary ingot which primary producers may receive during the fourth quarter of 1951. Individual ceilings were based on each company's historical use of scrap.

The Aluminum and Magnesium Division estimated that as a result of this action, a minimum of 5,500,000 pounds of scrap aluminum will be diverted each month from primary producers to secondary smelters.

NPA explained that since the introduction of price controls last Summer, the flow of aluminum scrap has been reduced substantially. The impact of this drying-up in the flow of scrap has been felt primarily by secondary smelters, and consequently by the small foundries and destructive users.

# FOR WEARING QUALITIES or just plain cost reduction, Appleton depends upon a combination of PMM processes.

IN helping to enforce the law and finding house numbers in the dark, spot lights on motor vehicles are doing their job night after night.

Manufacturer of a large proportion of these spot lights is the Appleton Electric Co., who make a light that operates under all conditions for extended periods of time. Appleton uses die castings, powder metal parts, and plaster mold castings.

## *Replacement due to wear eliminated by plaster mold gear*

Unique among the parts used by Appleton is the bevel gear shown in Figure 1. This gear, two of which are used in each light, was originally hobbed from Tobin bronze bar stock. In order to cut manufacturing costs a change was made to a bronze gear cast, ready for use, in a plaster mold. By this change, a saving of almost 25 percent was accomplished. Similar improvement has been obtained for a pair of pinions by changing to plaster mold casting.

Originally, a normal gear bronze was used for the part and excessive wear resulted. However, a tough manganese bronze having 95,000 psi tensile strength has been developed and is now used.

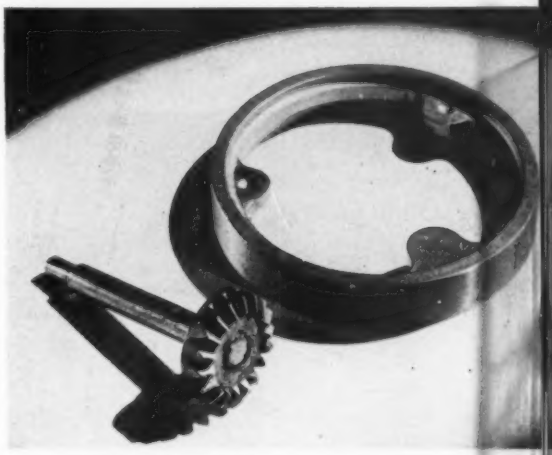
## *Structural part from metal powders saves 70 percent*

Another outstanding saving in cost has been accomplished by the substitution of a powder metal part for one formerly machined from bar stock.

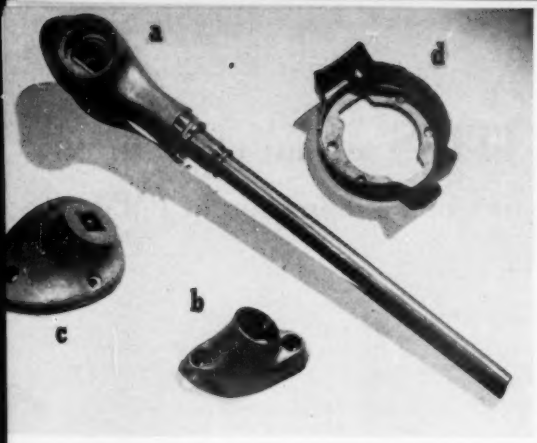
The swivel post in the Lorraine line of spot lights was machined from a B 1113 steel. It is now made from a 70-30 iron copper mixture of powders. This new swivel post, Figure 2, is supplied as an oil impregnated part ready for use; it represents a saving of 70 percent over previous manufacturing costs.

The die castings used by Appleton in their two lines of spot lights are shown in Figure 3. All of these parts except for the swivel base (Part C) were designed

PLASTER MOLD CASTING for a small bevel gear has solved the problem of undue wear while lowering costs. Another plaster mold casting has been introduced to eliminate high rate of rejects for a sand cast collector ring.

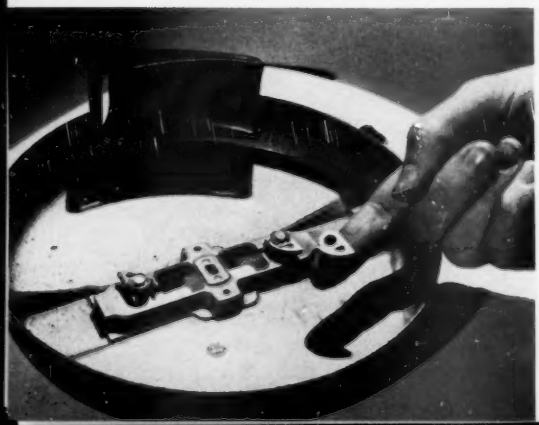


POWDER METAL swivel post is supplied oil impregnated for permanent lubrication and is received from the supplier ready to assemble. Costs are down 70 percent on this part.




**DIE CASTINGS** for what appear to be typical stamped covers and housings result in lowered costs, plus specific improvements in service characteristics.

**PERMANENT MOLD CASTINGS** in aluminum are simple in shape, low in cost and easy to finish.



**POWDER METAL** for a small ratchet pawl has some very close dimensions and meets minimum tensile strength specs of 30,000 psi.

originally as die castings and all parts are given the same final finishing treatment to be described. All are zinc die castings.

## *Die cast brackets and housings improve on drawn pieces*

The shaft housing (a) is used as received from the caster except for a facing operation on two shoulders and reaming and drilling the pin hole to key the housing to the brass shaft. The brass drive shaft is pressed into a cored hole in the die casting.

The "predetermined mounting" (b) is used on the Appleton line of spot lights. This mounting bracket is designed to fit all corner posts regardless of the make of car. No machining operations are performed on this part.

The use of a die casting for this part was partially dictated by the desire to have the piece truly universal. The design is such that any mechanic who is fairly handy with a file can take advantage of the easy workability of the alloy to fit the bracket to any car. Other manufacturing methods which might be used to make this part, such as sheet steel drawing, would not be as fitted and might require a multiplicity of brackets, each designed for a particular make and model of automobile.

The swivel base (c) is the one die casting on these spot lights that represents a change from a former manufacturing method.

Originally, this base was designed as a portion of the drawn case. To secure the desired shape four separate forming operations were required and, in addition, when the case was plated, all of the polishing and buffing both before and after the plating operation had to be done by hand.

Another defect of the single drawn construction was the high number of rejects due to cracking at the sharp angle between the case and swivel base.

By converting to a die cast swivel base fastened to the housing as a separate unit, the housing shape is such that all buffing and polishing can be done automatically, the extra drawing operations are eliminated, and there is no sharp bend where failure can occur.

As received from the caster, the bearing face is machined and the

continued on page 75

# FINISHING SECTION

MACHINING—Most precision metal molded parts require some machining operations. In this section will be found information to aid in planning and selecting the proper methods and equipment for these operations.

ASSEMBLING—Precision metal molded parts are generally components of assemblies. This section includes information on fastenings and methods for mass production assembly operations.

SURFACE FINISHING—Many precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating or chemical coating. This section includes information on the methods, processes and equipment used for these surface treatments.

***A Section Devoted To the Finishing Of***

**Die Castings**
**Investment Castings**
**Powder Metal Parts**
**Permanent Mold Castings**
**Plaster Mold Castings**

UNICHROME
Trade Mark

*News about*
# COATINGS for METALS
*Metallic . . . . . Organic . . . . . Decorative . . . . . Protective*

# Chromate treating costs reduced
## with UNICHROME DIPS for zinc

### A system for turning out good BRIGHT finishes

Despite shortages and restrictions, you can still turn out high quality bright finishes by turning to a *combination* finish. This consists of plating as allowed today, and then following up and fortifying the plate with a really tough, *clear* enamel.

United Chromium can help you with the *complete* system – the bright metal finish and the clear enamel. For example:

Unichrome Clear Dip Finish for zinc plate with an application of Unichrome Coating B-115 provides a system with excellent corrosion resistance and appearance similar to chromium.

Or . by depositing bright chromium from the Unichrome S.R.H.S.Chromium Bath over thin nickel or no nickel at all, and then using Coating B-115 for extra corrosion resistance, you'll also get a dependable bright finish.

Remember, in United Chromium you have the Company that knows *metal* finishes as well as their requirements in *coatings*. Consult us to learn how Unichrome *combination* finishes can solve your problem.

★

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Detroit 20, Mich. • Waterbury 20, Conn.
Chicago 4, Ill. • Los Angeles 13, Cal.
In Canada:
United Chromium Limited, Toronto, Ont.

A large automotive supplier is producing a yellow, iridescent, corrosion-inhibiting finish on zinc these days with more ease and less expense. Since switching from a "home made" chromate solution to a Unichrome Dip, the Company reduced material costs alone by nearly a third. And there's less trouble getting as good or better corrosion resistance than specified.

As this case indicates, UNICHROME DIPS provide a means of meeting chromate treating specifications for both civilian and defense production with easy-to-use, long-life, economical solutions.

ANOZINC* is still another process used for chromate-treating of zinc. It's especially suited for mass production, where it offers even greater economies. **Trade Mark*

**Dips Do the Job Chemically**

The various Unichrome Dips form their conversion coatings *fast*. A simple 5-second to 2-minute immersion does it, producing a surface finish integral with the zinc. You can get *black, olive drab, brass-color, iridescent yellow*, or *clear* finish from solutions which are easy to control.

**Anozinc Does It Electrolytically**

Anozinc uses conventional plating equipment and gives you a chromate finish with superior corrosion resistance and extra toughness. Parts can be handled wet, eliminating need for drying time and space. Three Anozinc finishes available – *black, yellow* or *clear* – from solutions that have long, trouble-free life.

* * *

Shell cases, propeller blades, bolts, screws, pump and carburetor die castings and many other parts are today getting the benefits of one of these Unichrome Dip or Anozinc finishes. If you want an economical answer to your own finishing problem, investigate them. Write for data.

### *Acidproof Tantalum cuts costs in heating acid solutions*

Acidproof to all plating solutions except hydrofluoric acid, the tantalum piping used in Unichrome Heat Exchangers and Coils has thin wall sections that promote more efficient heat transfer. Immune to attack, this tough tantalum heating and cooling equipment lasts longer, builds up no heat insulating deposits, and reduces servicing downtime to bed rock.

### Get the DC you need now —with a RECTIFIER

Unichrome Selenium Rectifiers, in sizes from 250 up to 10,000 amperes, are now ready to supply dependable, unfailing power for electroplating and anodizing. Ruggedly built for long service, they are now available for fast delivery.

*For additional information circle No. 72 on the Reader Service Card*

# PAINT SPRAYING of metal parts for HIGH VOLUME PRODUCTION

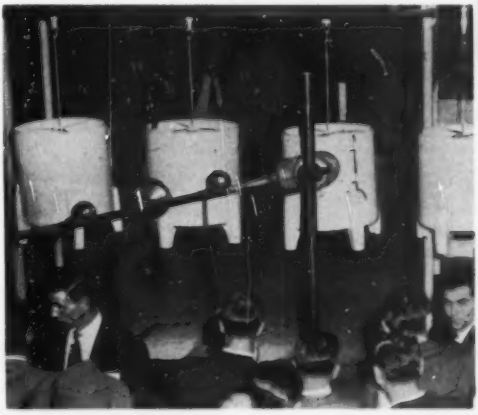
APPLYING AUTOMATIC EQUIPMENT to spray painting is one way of stepping up production of attractive finishes. This manufacturer of vacuum cleaners employs a chain conveyor with special work holders to carry the vacuum cleaner housing parts to the automatic spray equipment. Spray is applied automatically as the work rotates. DeVilbiss spray equipment and water wash spray booth are used. Photo courtesy Sprayways.

CLEAR LACQUER FINISH is applied to aluminum gas tanks for Evinrude outboard motors by manual spray methods using DeVilbiss equipment. This procedure still finds important use for parts of a size and shape not suited for automatic operation, or where many parts of differing size and shape must be handled on interrupted scheduling. Photo courtesy Sprayways.

A NEW METHOD of electrostatic atomization was introduced at the National Metal Show in Detroit, called the Ransburg No. 2 Electro-Spray method. In this process, the article to be coated is carried past a radically new type of spray "gun" which operates without compressed air and involves no overspray.

The gun consists essentially of a hollow, cone-shaped head. Coating material is metered at a constant rate to the apex of the head, and rotation of the head spreads the material uniformly over its inner surface, causing the material to flow evenly to the outer edge.

A source of electrostatic high potential, having one terminal connected to the head, creates a strong electrostatic field between the head and the article to be coated, which is grounded by the conveyor. The force of this field transforms the material into a spray of fine, charged particles and creates an irresistible attraction that pulls the spray particles to the grounded article. Photo courtesy Ransburg Electro-Coating Corp.



# Cowles A M CLEANER

## THE NEW NON-ETCHING TYPE ALUMINUM CLEANER FOR USE IN SOAK TANK CLEANING

**THE NON-ETCHING CLEANER THAT REALLY CLEANS**

It was specifically designed to remove drawing, stamping, spinning compounds, rolling oils, marking inks, crayon marks and general shop dirt from common aluminum alloys prior to spot welding, anodizing or other finishing operations.

COWLES TECHNICAL SERVICE
Gladly Furnished Upon Request

TRY COWLES A M CLEANER FOR A BETTER, QUICKER JOB OF CLEANING ALUMINUM

WRITE FOR TECHNICAL DATA SHEETS

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**COWLES CHEMICAL COMPANY**
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NOTE Try Cowles P.C. Cleaner if you want a cleaner that really gives a rapid etch.

For additional information circle No. 19 on the Readers Service Card

# PROTECTION OF ALUMINUM by nickel plate over synthetic base resists corrosion and erosion

A NEW TYPE of hard, stress-free and erosion resistant surface coating for aluminum has been developed by Bart Laboratories Co., Inc., of Belleville, N.J. in response to requirements of the aircraft industry for greater protection of exposed parts.

The new process, identified by the trade name Alni-Clad, involves the plating of nickel on aluminum by means of a synthetic base applied to serve as an intermediate coating between the base metal and electroplate.

The aluminum piece to be Alni-Clad is prepared for plating by spraying the synthetic material on the surface to a thickness of approximately .003. The piece is then put through a drying cycle and into the nickel tank where nickel is deposited to the desired thickness. Usually, this has ranged from .010 upwards, depending upon the service requirements of the part.

The bond between the synthetic coating and the nickel is reported to be excellent, and to stand up when exposed to temperatures ranging from -50 to 200F. Adhesion tests have indicated tensile strength of the bond to be in the order of 1200 psi.

Time of the complete cycle of coating, drying and plating depends upon size of the piece and thickness of coating. With present operational facilities, exceptionally large components are being Alni-Clad in a cycle of about 24 hours.

The finished pieces have hardness of 400-450 Vickers and are stress free. All aluminum alloys that have been processed so far have produced satisfactory results, although no systematic attempt has been made to test a full range of alloys.

Many parts of intricate shape can be subjected to this process, depending, of course, upon the ability to spray all surfaces requiring protection. Both interior and exterior surfaces can be treated successfully.

Thickness of coatings, it is reported, are accurately controlled for depth and uniformity.

Of particular interest to the aircraft industry which has already found important use for this process, is the ability of the coating to withstand corrosion from salt spray or alkalies, and to hold up well when exposed to flying grit and sand. The organic material acts as an insulator for the aluminum.

When finished, the coating is semi-bright, but can be polished chemically or mechanically to obtain a lustre.

Although applications have so far been confined to the aircraft industry, the potential applications of this process for industrial components are believed to be great. In some instances, the physical characteristics of this coating may open up new design applications for aluminum.

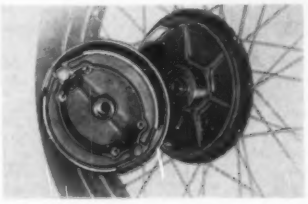
# PHOSPHATE COATING: the secret of obtaining a strong cement bond on aluminum die castings

THE Indian Motorcycle Co. utilizes aluminum die casting for its brake shoes.

Following the best current policy, the brake linings are bonded to the shoes with a thermo-setting plastic cement. As is the case with all aluminum parts it is commercially impossible to avoid the presence of an oxide film on the surface of the casting.

When the lining material was cemented to the die casting, it was found that the presence of the oxide film prevented formation of a good bond between the brake band and the shoe. A large number of different adhesives and processes were tried for this job and the company had decided to eliminate the die cast parts when the suggestion was made that a phosphate coating on the aluminum might be advantageous.

This treatment was tried and found successful. Utilizing the proper cement on the phosphate coated die casting, the lining material is now bonded so firmly that a tensile load of 6000 pounds is required to cause failure. This failure always occurs by separation of the brake lining material instead of failure of the cemented bond.



# PMM NEW PRODUCTS

**For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail — no postage is required.**

## CUTTING COMPOUND FOR STAINLESS METALS

*Fel-Pro C-5 Cutting Compound*
*Felt Products Manufacturing Company*

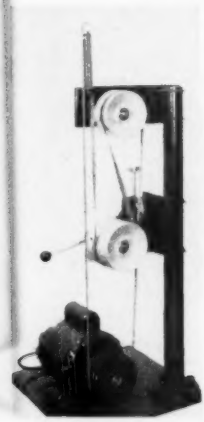
SPECIAL FEATURES: Said to prevent galling and pitting of metal surfaces, increase tool life, permit higher cutting speeds and assure greater accuracy through maintenance of uniform cutting temperatures. Recommended for boring, turning, tapping, threading, broaching, grooving, sawing and other metal working operations.

SPECIFICATIONS: Has high temperature and pressure resisting qualities. Said to withstand temperatures to 1800 F.

***For additional information circle No. 105 on the Reader Service Card***

## ID GRINDING OR DEBURRING FOR SMALL PIECES

*Tongue Sander*
*Behr-Manning Corporation*



SPECIAL FEATURES: Specially designed for inside diameter sanding, grinding and polishing work. Adaptable to either free running or platen backed coated abrasive belt operations.

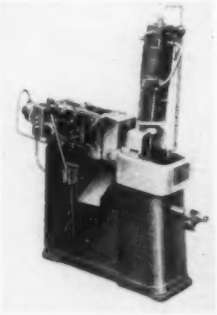
SPECIFICATIONS: Tongue sander is not sold by Behr-Manning Corporation but can be assembled using standard available parts. Has been thoroughly tested with nose bearings from 7/8" OD to 1 3/8" OD. Larger the diameter the less bearing trouble will be encountered. If belts wider than ½" are used it is recommended that two bearings be pressed into a crowned sleeve to be used as the nose pulley. When a single bearing is used as the nose pulley, a crown is ground into the outer race to facilitate belt tracking. Belt is twisted over backstand idler pulley to prevent grain side from abrading it.

In pictured assembly nose pully bearing 7/8" 38KTT Fafnir. Used standard 3" Delta Idler pulley setup which includes a shaft and bearings. Motor is fully enclosed 1725 RPM ¾ HP, single phase, 110-220 volt, AC, with a 5½" diameter pulley that generated 2600 SFPM belt speed.

***For additional information circle No. 106 on the Reader Service Card***

## ONE POUND DIE CASTING MACHINE

*DCMT Model IMP-96*
*DCMT Sales Corporation*



SPECIAL FEATURES: Incorporated into this model IMP-96 are all the advantages inherent in model M55A die casting machine. Added are a pilot-operated impact type injection cylinder with slide-valve in the head, controlled by an easily operated trip lever and employing a safety interlock valve to prevent metal injection before the dies are fully closed, and a double toggle air-operated die unit of larger capacity and locking load. Thus, higher pressures can be exerted on the molten metal from normal airline pressures (80-100 lbs), giving more uniform and homogeneous castings.

SPECIFICATIONS: Operates on a standard 80 p.s.i. airline and consumes only .55 cu. ft. of fresh air per cycle of operation. If air is not already available needs only an inexpensive compressor. It exerts 1,620 lbs. pressure on the metal with a 1½" diameter plunger. Casting capacity is 12 ozs., pot capacity, 45 lbs. (zinc). It takes up a floor space of 2½ feet by 1 foot and weighs 450 lbs.

***For additional information circle No. 20 on the Reader Service Card***

## AIR SCREW DRIVER

*Cushion Clutch Air Screw Drivers*
*Ingersoll-Rand Co.*

SPECIAL FEATURES: Cushion clutch consists of two units; an engaging clutch and a torque limiting clutch. Engaging clutch enables screwdriver to be moved from screw to screw without stopping motor. Ball-type torque limiting clutch permits adjustment for precise torque control and enables operator to drive all screws to same degree of tightness. Ball-bearing construction keeps friction to absolute minimum.

SPECIFICATIONS: Available in three series for driving small, medium and large screws, free-running or self-tapping. Reversible and non-reversible models are made in each series and the two larger series can be had with either straight or pistol grip handles.

***For additional information circle No. 107 on the Reader Service Card***

## SAWS FOR DEEP ACCURATE CUTS IN HARD METALS

*Carbide Tipped Metal Slitting Saws*
*North American Products Company*

SPECIAL FEATURES: Used for complete roughing and finishing, slitting and grooving operations of steel, cast iron, aluminum and other non-ferrous materials. Claimed to have increased cutting speeds four to five times over steel blades, and in one case cut through "Inconel X" when no other blade could be found to do the job.

SPECIFICATIONS: Blades are from 3" to 18" in diameter in widths from .085 to ½". They have taken production cuts in cast iron 6¾" deep, in steel 2¼" deep, and have held size to .002 on slots 4½ feet long.

***For further information circle No. 108 on the Reader Service Card***

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## SEALANT FOR LOW DENSITY METALS

*Impregnant P. E. No. 1*
*Western Sealant, Inc.*

SPECIAL FEATURES: Claimed to be resistant to higher pressures and wide temperature ranges as well as solvents, chemicals, acids, alkalies and fuels. Treated parts show no discoloration, change in critical tolerance, nor other visible signs of impregnation. Applicable to ferrous as well as non-ferrous metals.

SPECIFICATIONS: Contains 100% solids. Is thermo-setting copolymer which does not react with industrial liquids and gases. Application is quick, economical and permanent.

***For further information circle No. 109 on the Reader Service Card***

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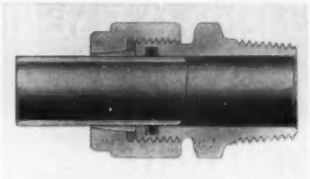
## O-RING TUBE COUPLING

*Lenz O-Ring Tube Coupling*
*Lenz Company*



SPECIAL FEATURES: An easily assembled leak-proof connection for copper or steel tubing. Seal and grip are separate and there is no metal-to-metal seal. For assembly no exact tube length is necessary and the tube does not have to be cut square.

SPECIFICATIONS: The tube is held by friction grip between the nut and taper sleeve. With the "O-Ring" providing the seal, excessive wrench torque is unnecessary because the seal does not depend on the tightness of the nut. To prevent shearing of the "O-Ring" a chamfer should be filed on the tube end.

***For further information circle No. 110 on the Reader Service Card***

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## HEAVY AND LIGHT DUTY DRILLING UNITS

*Heavy Duty (4000 series);*
*Light Duty (4000 S-A Series)*
*Locke Gage Company*

SPECIAL FEATURES: Both units feature position control drilling and are completely automatic, eliminating the use of gears, brakes or clutch. They have identical hydraulic check mechanisms that permit "control cycles" and built-in electric solenoids that start drill unit action. Units are adaptable for tapping and burnishing operations. Deep hole drilling attachments can be added for depths up to 3 inches.

SPECIFICATIONS: Heavy Duty (4000 series): self-contained power source including two cycle refrigerator type compressor permitting adjustments from 0 to 500 pounds. Unit capable of drilling up to 5/16" diameter in alloy steel or equivalent.

Light duty (4000 S-A series): employs shop air for power against a 3 square inch piston surface. Capable of drilling ¼" diameter in mild steel or equivalent.

***For further information circle No. 111 on the Reader Service Card***

continued on page 68

To the many users of Abbott Tumbling Barrels and Abbott *deep hardened*, carbon steel Burnishing Materials we send this wish: — May your holiday season be as bright as the products you finish with our Burnishing Shapes.

*May we serve and help you in the years to come?*

ABBOTT

**THE ABBOTT BALL COMPANY**
1084 NEW BRITAIN AVE.
HARTFORD, CONN., U.S.A.

***For additional information circle No. 1 on the Reader Service Card***

**This new FREE booklet** tells how two new types of Oakite-developed solvent detergents make it easier and cheaper for you to do many difficult metal-cleaning jobs. Here are some of the subjects covered in the booklet:

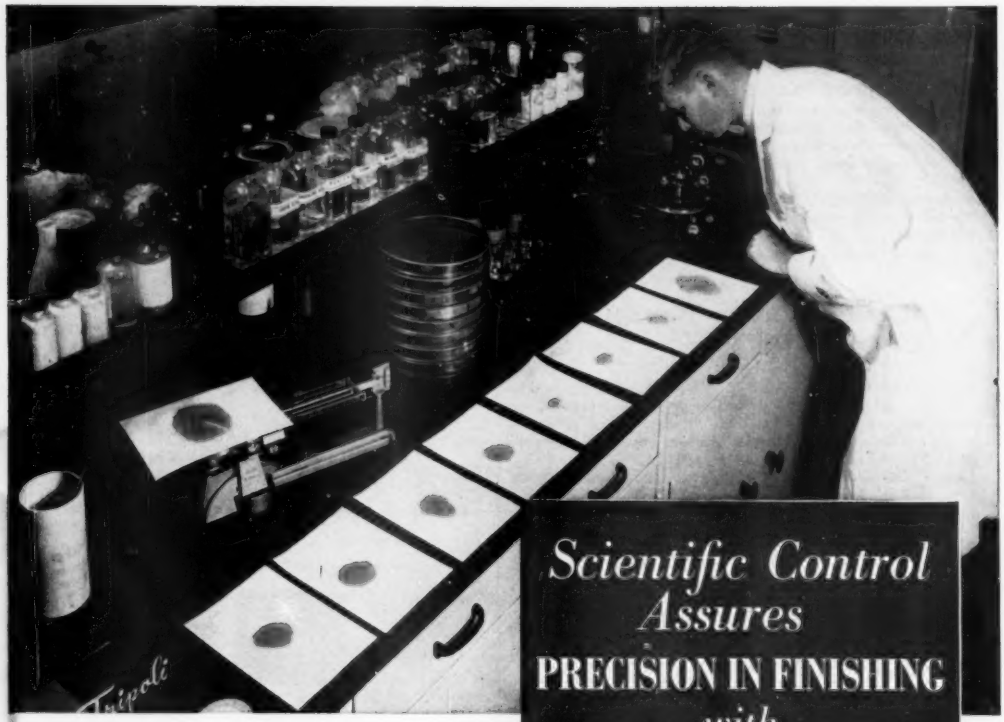
- **Cleaning metal between processing operations**
- **Precleaning before painting or plating**
- **Stripping paint**
- **Providing temporary protection against rust**
- **How to use Oakite solvent detergents:**
  - **Spray-washing machine method**
  - **Spray-rinse method**
  - **Soak-tank method**
  - **Manual method**

**FREE** For a copy of this 24-page booklet (illustrated with photographs and diagrams), write Oakite Products, Inc., 34G Thames St., New York 6, N. Y.

*Technical Service Representatives in Principal Cities of U. S. & Canada*

**OAKITE** SPECIALIZED INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

***For additional information circle No. 52 on the Reader Service Card***



*Scientific Control Assures*
**PRECISION IN FINISHING**
*with*

# Stevens Compositions

Metal finishers have found that Stevens has the composition they can depend on for constant quality and maximum polishing and buffing efficiency. That is because for more than half-a-century Stevens research and production facilities have been devoted to creating better compositions for precision operations. Every conceivable measure is taken to provide the finest in buffing and polishing compositions for Stevens customers—for every finish, every metal.

For example, raw materials—such as abrasives and binders—are subjected to a careful analysis in Stevens' modern, well-equipped laboratory before they are accepted for use in Stevens compositions. Abrasives must meet an exhaustive screening test to make sure they are of the correct coarseness for the specified composition. Binders are subjected to rigorous examination to make sure they possess the right properties to meet each varied job requirement.

This scientific control is carried through the entire operation of composition manufacture at Stevens—from mixing to moulding to cooling to packing. The Stevens name on a polishing and buffing composition is your guarantee that the product will meet the most rigorous tests. Let your nearby Stevens representative acquaint you with the many types of compositions Stevens has developed to meet every requirement. Call him today or write to Frederic B. Stevens, Inc., Detroit 16, Michigan for complete information.

**METAL FINISHING EQUIPMENT AND SUPPLIES SINCE 1883**

**FREDERIC B. STEVENS INCORPORATED**
**DETROIT 16, MICHIGAN**

*For additional information circle No. 66 on the Reader Service Card*

# PMM USEFUL LITERATURE

## PROCESSES

**Investment Casting Advantages: No. 145**
The advantages of designing for precision investment castings are given in literature available from the Midwest Foundry Company. Three investment castings in stainless steel are the subject of case history reports.

**Economy Through Investment Castings: No. 146**
Pictures of castings which were produced by the investment casting method at a saving of 10 to 70 percent under the cost of machining are included in a bulletin "Cost Reduction thru Investment Casting" offered by Casting Engineers, Inc.

**Powder Metallurgy—Facilities and Products: No. 147**
The complete facilities of the Michigan Powdered Metal Products Co., Inc. for producing powdered metal parts of all kinds are described and illustrated in a two color bulletin offered by that company. Also available from them is a bulletin containing a brief outline of characteristics of powdered metal compacts and literature on one of the company's leading items, the Haller Oil Well Bearings.

**Investment Casting Technical Data: No. 148**
A bulletin discussing the possibilities and limitations of precision investment casting is available from the Hitchiner Manufacturing Co., Inc. It contains general information as well as technical and design data helpful to the design engineer.

**Casting High-Melting, Non-machineable Alloys: No. 149**
How Microcasting offers design engineers many opportunities for product improvement of small components with substantial savings in cost is explained in a 16-page booklet available from Microcast Division, Austenal Laboratories, Inc. Special attention is called to the investment casting of high-melting point, non-machineable and non-forgeable alloys.

**Modern Die Casting Plant: No. 50**
The modern facilities and services available at the New England Die Casting Co., are described and illustrated in a brochure put out by that company called "The Inside Story". The brochure also discusses die casting as a satisfactory and inexpensive means for making difficult parts.

**Economical Uses of Magnesium: No. 150**
"How Magnesium Pays" is a book giving case studies of the economical uses of magnesium in a wide range of products. It's put out by the Dow Chemical Co.

## MATERIALS AND EQUIPMENT

**Industrial Machines for Powder Compacting: No. 151**
A two-color booklet containing information on F. J. Stokes Machine Company's complete line of industrial tablet compressing machines which among many other things can be used in making powder metal compacts, is offered by that company.

**Designing with Beryllium Copper: No. 152**
A series of comprehensive articles concerning the uses and advantages of beryllium copper castings and molds is offered by The Beryllium Corporation. The series, prepared by Beryllium design engineers, is complete with drawings, graphs, charts and illustrations. Also available from this source is their monthly technical bulletin.

**Lathes, Drill Presses, Shapers, and Accessories: No. 153**
Practically the entire line of precision lathes, drill presses, shapers, attachments and accessories manufactured by the South Bend Lathe Works is illustrated and described in two unique pygmy catalogs offered by the company. These catalogs measure only 2½" by 1⅝" each.

**Wacko Weight Slide Rule: No. 154**
The Wacko weight slide rule is an all purpose rule which, among other things, enables the user to calculate the weight of various sizes and shapes of metals quickly and accurately. Additional information on this all metal rule is available from the Warren-Knight Company.

**Hydraulic Cylinders: No. 155**
More than 100 different models of hydraulic cylinders, each in ten bore diameters, are illustrated and described in a catalog offered by the manufacturer, Rivett Lathe & Grinder, Inc. The three-color book is complete with working drawings and specifications for each model and size cylinder.

**Alloy Composition Chart: No. 156**
A 2-page bulletin containing a complete listing of ferro-alloys together with their compositions and specific applications is available from Vanadium Corporation of America.

**Heavy Duty Pumps for Pressures to 3000 and 5000 p.s.i.: No. 157**
Three new constant delivery axial piston pumps for pressures up to 3000 and 5000 p.s.i. are illustrated and described in a 4-page bulletin offered by The Oilgear Company.

**Precision Scales Suitable for Metal Powders: No. 158**
The different models of Shadograph scales which are claimed to increase reading accuracy 300% by the substitution of light projection indication for mechanical readings are described and illustrated in a 4-page catalog offered by The Exact Weight Scale Co. These scales are suitable for precision weighing of metal powders.

**Lubrication with Molybdenum-Disulfide Powder: No. 159**
Industrial case histories describing the successful use of Molykote-lubricants in various applications including dies, press fittings, etc., are contained in an 8-page bulletin available from The Alpha Corporation.

**Compact Heat Treating Slide Chart: No. 160**
A 5" x 11" chart which gives complete answers to items such as heating speed, furnace atmosphere, temperature for drawing and time for drawing is offered by The Carpenter Steel Company. The chart contains data on type analysis of the more popular types of die steels, forging heat, annealing treatment and hardening treatment. It also includes facts on quenching and effect of drawing temperature on hardness.

**Synclinal Type Filters: No. 38**
Complete engineering data on synclinal type filters for sump or line installation on all hydraulic and low pressure liquid recirculating systems is contained in a folder available from the Marvel Engineering Company.

**Permeable Casting Plaster for Non-Ferrous Metal: No. 161**
Complete information on Hydroperm, a metal casting plaster made from Hydrocal gypsum cement, is contained in a bulletin

To meet MILITARY SPECIFICATIONS

for Cleaning • Rust-Removing • Etching Phosphatizing and General Metal Conditioning of all kinds of Metal Surfaces

Use PREP PRODUCTS!

| SPECIFICATION NUMBER | CONFORMING MATERIAL |
|---|---|
| MIL-C-5541 (see also QPL-5541-1) | Lyfanite |
| MIL-S-5002 | Lyfanite |
| MIL-C-10578 | |
| Type 1 | Metalprep Nos. 77, 102—Alumiprep No. 1 |
| Type 2 | Metalprep Nos. 10, 15—Alumiprep No. 20 |
| JAN-C-490—Grade II | |
| Type 2 | Emulsoprep |
| Type 4 | Metalprep, Prep-Pik-L, Alumiprep, Prep-Rite |
| Type 5 | Metalprep, Alumiprep, Prep-Pik-L, Prepwash |
| Type 6 | Emulsoprep No. 710-E.C. |
| U.S.A. 3-213 | (See MIL-C-10578) |
| U.S.A. 3-192 | Metalprep Nos. 28, 10, 15 Alumiprep No. 20 |
| U.S.A. 98-20007 | Metalprep Nos. 10, 15 Alumiprep No. 20 Prep-Rite No. 16 (See AN-F-20) |
| U.S.A. 72-53 | Lyfanite |
| AN-F-20 | Metalprep Nos. 10, 15, 77, 102 Alumiprep Nos. 1 and 20 — See MIL-C-10578 |
| AN-E-19 | Lyfanite |
| AN-C-170 | (See MIL-C-5541) |
| TAC-ES-431 | (See MIL-C-10578) |
| AXS-1245 | (See JAN-C-490, Grade II) |
| Engineering Corps—T-1184 | Metalprep No. 28 |
| U.S.N.—Appendix 6 | Metalprep |

51-C

Send for Data Sheet • Advise Govt. Spec. Number

NEILSON CHEMICAL CO.

3982 Tecumseh Rd., Windsor, Ont. — 6563 BENSON ST., DETROIT 7, MICH. — 3411 Union Pacific Ave. Los Angeles 23, Calif.

For additional information circle No. 49 on the Readers Service Card

2 DUMORE DRILL HEADS cut multiple-drilling costs in half

for Omco Products Corporation

**PROBLEM:** This Ohio subcontractor was getting only 90 pieces per hour, drilling 3 holes in a small airplane part. Set-up used was a tumble jig and a 4-spindle multiple drill head.

**SOLUTION:** Output was doubled and costs cut from $10.95 to $5.82 per thousand by set-up shown above. One Dumore head drills from left, one from right, and handpress from above. Hand trip controls Dumore heads.

Would you pay $200 to save $5,000 a year . . . $400 to save $10,000? Sure you would. And that's the kind of savings users of small drills are getting with the new Dumore Automatic Drill Head.

You'll have to be the judge of how much this revolutionary tool can save you, because only you know your problems. That's why we're urging you to write for the facts Today!

Write for free CERTIFIED REPORT

COMPLETE JOB DATA by an unbiased research organization

DSM-7B

The DUMORE Company

Dept. M-76 • RACINE, WISCONSIN

Export Address: 13 E. 40th St., New York, N.Y., U.S.A.

For additional information circle No. 23 on the Readers Service Card



offered by United States Gypsum Company. The bulletin contains full information on the use of the product in gaining the best mold results.

### Strong Aluminum Casting Alloy: No. 162

Two bulletins concerning Frontier 40-E Aluminum Alloy, a non-heat-treated alloy which owes its strength to a unique metallurgical formula, are available from the Frontier Bronze Corporation.

## FINISHING

### Corrosion Resistance for Zinc Die Castings: No. 72

Bulletins containing details on corrosion resistant chrome plating of zinc plate and zinc die castings with Unichrome dips, fast chemical processes, or Anozinc, an electrolytic one, are available from United Chromium, Incorporated. Also offered by this company is the Unichrome Observer, a monthly house organ containing up-to-date developments in the metallic and organic coatings field.

### Impregnation of Castings with Efficiency and Safety: No. 163

Polyplastex MC Sealant is a 100 percent solids sealant for impregnation of microporous castings. When cured, Polyplastex MC is converted into a 100 percent solid filler with excellent chemical and physical properties. Further information is available in bulletin form from Polyplastex Impregnation Corp.

### Buffing Compound and Finishing Materials: No. 164

A new liquid tripoli buffing compound which is non-inflammable, requires no de-greasing and does not settle is described in a catalog containing a complete line of finishing materials from McAleer Manufacturing Division of the Higbie Manufacturing Company.

### Cast Alloy Tools: No. 165

A comprehensive 44-page manual entitled "Haynes Stellite Metal-Cutting Tools" is available from Haynes Stellite Company, a division of Union Carbide and Carbon Corporation. The manual describes four different grades of cast cutting tool alloys and gives their mechanical, physical and chemical properties to help in selecting the right tool alloy for various cutting operations. Included are 80 illustrations and tables giving proper cutting angles, speeds, feeds and depths of cut for turning, boring and milling. The catalog section of the manual describes the Haynes Stellite alloy tool forms that are available.

### Silvaloy Brazing Alloys: No. 166

A pocket sized bulletin containing information on Silvaloy brazing alloys, which make possible strong joints which are liquid and gas tight, is offered by the Steel Sales Corporation.

### Better Electroplating on Steel: No. 52

Specific recommendations for improving the average cycle for cleaning steel before electroplating are given in a 28-page illustrated booklet, "Four Good Steps Toward Better Electroplating on Steel", available from Oakite Products, Inc.

### Up-to-date Market Data on Metal Finishing Supplies: No. 167

The Udylite Corporation offers a 6-page buying guide listing metal finishing supply prices which are checked and reissued monthly together with essential market data and a forecast based on latest information.

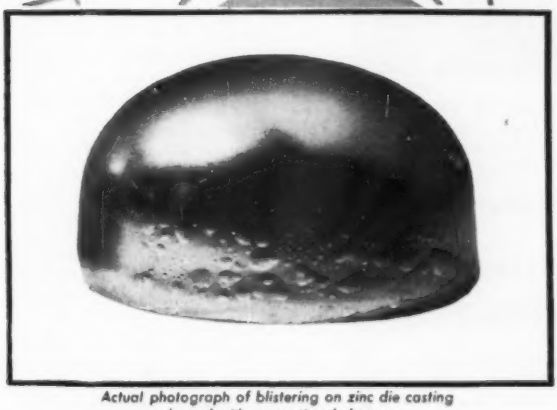
### Churchill Finger-Buffs: No. 168

A catalog containing complete information on George B. Churchill Co., Inc.'s line of Churchill Finger-Buffs for buffing, polishing and deburring is offered by that company.

Continued on page 56

# STOP BLISTERING, STREAKING

## ON ZINC BASE DIE CASTINGS!



*Actual photograph of blistering on zinc die casting cleaned with conventional cleaner.*

Designed especially for reverse current electro-cleaning of zinc base die castings prior to electroplating, new Diversey No. 505 completely, safely removes all unwanted deposits! In addition, Diversey No. 505 conditions the surface of the zinc, providing better adhesion between the electro plate and the base metal!

This unique, double-action of Diversey No. 505 helps provide a uniformly clear, brilliantly lustrous finished surface . . . one free from blistering, peeling and streaking! Diversey No. 505 is economical, easy to use and available now! Investigate Diversey No. 505 today! *Mail the coupon for FREE copy of New Bulletin.*

# DIVERSEY No. 505

## *NEW* electro-cleaner and surface conditioner!

MAIL THIS COUPON TODAY

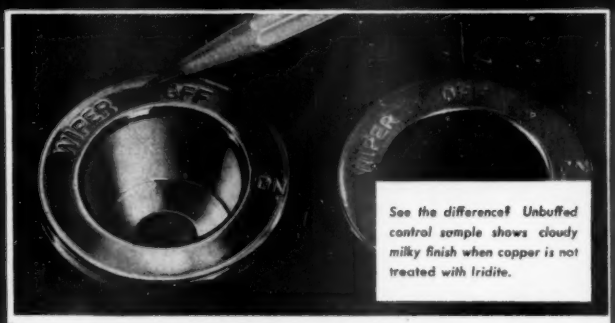
**THE DIVERSEY CORPORATION**
*Metal Industry Department*
1820 Roscoe Street • Chicago 13, Illinois
In Canada: The Diversey Corporation (Canada) Ltd.
Lakeshore Road, Port Credit, Ontario

**THE DIVERSEY CORPORATION**
*Metal Industry Department*
1820 Roscoe Street, Chicago 13, Illinois
Gentlemen:
Please send me complete information, including New Bulletin on Diversey No. 505.

*Name*_____
*Title*_____
*Company*_____
*Address*_____
*City*_____ *State*_____

*For additional information circle No. 21 on the Readers Service Card*

# LOOK— what you get WITHOUT BUFFING




*See the difference? Unbuffed control sample shows cloudy milky finish when copper is not treated with Iridite.*

## with IRIDITE® Metcote in COPPER-CHROME FINISHING

This sparkling bright finish is the result of just a simple dip in Iridite Metcote between the copper and chrome plating cycles! You actually get the clear, bright appearance of copper-nickel-chrome because the Iridite treatment gives maximum brilliance and clarity to the copper undercoating.

**FORGET BUFFING COSTS, PR PLATING!** Once you've properly prepared the base metal . . . steel sheet or zinc casting . . . you can completely forget buffing costs because no further buffing is required! And, there is no need to resort to PR plating or extra brightener in the copper plating solution because of the chemical polishing action of Iridite Metcote. The result? A pleasing clear, sparkling bright finish that is ideal for decorative products.

**PROVE IT YOURSELF!** Send us samples of your product for test-processing with copper, Iridite Metcote and chrome. Then make your own inspection and tests. Once you've seen your own product treated with this Iridite finishing system you'll never go back to slower, more costly buffing for your bright finishing. Start saving money *now*—write us direct or call in your nearest Iridite representative. Look under "Plating Supplies" in your classified telephone directory.

*Iridite is approved under government specifications.*

**ALLIED RESEARCH PRODUCTS**
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL CITIES, West Coast: L. H. BUTCHER COMPANY
Manufacturers of Iridite Finishes




### Chromium Plating without Intermediate Buffing: No. 169

The use of Lea Copper-Glo in the Ronal Bright Copper Process makes it practicable to plate properly prefinished steel and die castings directly with chromium without any intermediate buffing operation according to information on this process available in a folder from The Lea Manufacturing Company.

### Metal Cutting and Cutting Fluid Action: No. 170

A comprehensive booklet entitled "Fundamental Aspects of Metal Cutting and Cutting Fluid Action" is available from The Cincinnati Milling Machine Co. The booklet was prepared by Hans Ernst, the company's director of research. It is complete with photographs, diagrams and bibliography.

### Paint-Anchoring Phosphate Treatment for Metals: No. 171

Anchorite 100, a paint-anchoring corrosion-resistant phosphate treatment for metals, is described in an 8-page two-color booklet offered by Octagon Process, Inc. The booklet gives in detail the common causes of paint failure and how they can be prevented. It then goes into methods of application of the Anchorite 100 treatment and follows with a discussion of typical products to which it can be applied.

### Spray Painting with Electrostatic Atomization: No. 172

The Ransburg No. 2 Electro-Spray Process embodies the principle of electrostatic atomization in spray painting. A strong electrostatic field between the spray head and the article to be coated creates an irresistible attraction that pulls the spray particles to the grounded article. This accounts for complete electrostatic deposition. Further information on this process is contained in a booklet offered by the Ransburg Electro-Coating Corporation.

### Simple Process for Applying Chromate Protective Coatings: No. 173

Zinc plate and zinc base die castings receive an adherent chromate coating when immersed for a few seconds in a solution containing Enthox. Further information on this product is available from Enthone, Inc.

### Improvement in Horizontal Broaching Machines: No. 174

The improved line of 4 to 15 ton capacity horizontal broaching machines manufactured by the Colonial Broach Company is covered in a 4-page technical bulletin offered by that company. A complete description of the machines together with a

resume of the improvements to construction, accessibility and controls is included.

**Wet Blasting Machine for Close Tolerance Work: No. 175**

A new machine for wet abrasive blasting which uses a vertical-type pump for slurry recirculation and compressed air for propelling the slurry at the work is described in a 4-page bulletin offered by American Wheelabrator and Equipment Corp. The machine is intended for all cleaning applications in metal-working and chemical industries where close tolerances must be maintained or where the breakdown of sharp edges or corners must be avoided.

**Houghton's Government Specification Products: No. 176**

A compact reference list of products in the Houghton line meeting government specifications is offered by E. F. Houghton & Co. Listing includes specification number, description and name of approved rust preventives, lubricants, metal working aids, cutting aids and leathers and synthetic rubber.

**Electroformed Paint Spray Masks: No. 177**

Paint spray masks that are electroformed to fit the surface of the product exactly are described in literature available from James H. Matthews & Co. These shell-like Electrocast spray masks can be handled by unskilled operators. Bridging permits spraying completely around any portion of the surface, while baffling allows the spraying of many colors on a single product with a single mask.

**Buffing Wheels Require No Break-In Period: No. 178**

Cotton buffs that are ready to use in finishing operations as received without break-in period are described in literature from United Buff Products Corp. Their Airflow "Pressure Cooled" buffing wheels are said not to ravel or burn, and to reduce compound consumption. They are available in various constructions and densities for specific applications.

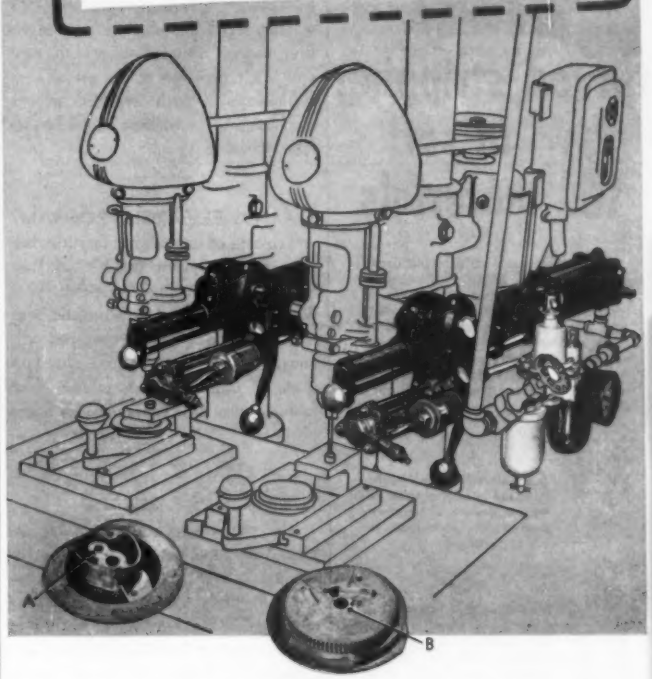
---

## ELECTROLYTIC FINISH FOR MAGNESIUM DEVELOPED

A new finish for magnesium and magnesium alloys has been announced by the Army Ordnance Corps. The finish will be known as HAE in honor of H. A. Evangelides, an electrochemist in the Pitman Dunn Laboratory at Frankford Arsenal, who developed it.

The finish can be applied electrolytically to any of the cast or wrought commercial magnesium alloys. Outstanding characteristics are its excellent corrosion resistance, high melting point, good dielectric strength, and hardness.


**When Joe cut labor costs 65% on this die cast reaming operation he earned more than a pat on the back**




**THE JOB:** Finish ream two holes in a zinc die cast record changer part. Hole "A" on one side of the part, hole "B" on the reverse side.

**JOE'S SOLUTION:** He equipped two 14" drill presses with Bellows "Controlled-Air-Power" Feeds and Hydro-Checks; installed a two-position fixture (load and unload in the front position, ream in the back position.)

**THE RESULT:** Labor costs cut 65%.

LIKE TO KNOW HOW JOE DID IT?

● That's what alert production men like about Bellows "Controlled-Air-Power" Devices. They spark imagination; set the old creative bug working; give an engineer ideas . . . and, equally important, help him put them to practical, profitable use.

Bellows "Controlled-Air-Power" Devices (air motors, air-powered work and tool feeds, air-operated rotary work feed tables, air-powered work holding and clamping units) convert standard hand-operated machine tools to automatic units, make tool-room built special purpose machines practical and inexpensive even for short runs.

*Write for* Form Facts File 46-396. We'll send it, without cost or obligation, along with many other similar factual stories . . . full of ideas you can use to cut costs on secondary die cast operations. *Address: Dept. DC 1251.*

1129

**The Bellows Co.**

AKRON, OHIO

*For additional information circle No. 15 on the Reader Service Card*

# TAP-LOK INSERTS

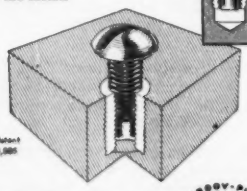
## *prevent* thread stripping in soft materials

The unique self-tapping feature of TAP-LOK INSERTS substantially reduces assembly costs in continuous production, by eliminating a separate tapping operation. This method of increasing the shear area of tapped threads in softer-than-steel materials is fast and economical, consisting of three easy steps:

① A simple driving tool with a threaded stud engages the interior threads of the insert until its shoulder contacts the top of the insert.

② The driving tool then turns the insert into a cored or drilled hole equal in size to a tap drill hole for the insert's external thread. The insert cuts its own thread.

③ After the insert is seated, the male threaded member is driven into the interior thread of the insert.



U. S. Patent 2,495,980

Send for samples and descriptive folder.

Also manufacturers of Groov-Pins for positive locking press fit.

**GROOV-PIN CORPORATION**

1122 Hendricks Causeway, Ridgefield, New Jersey

*Circle No. 28 on the Reader Service Card*


### APPOINT EASTERN REPS

Tinnerman Products, Inc. announces the appointment of New York Brass & Copper Company, Inc. as general distributors of Tinnerman's standard, Flat-type Speed Nuts in the metropolitan area of New York. The Speed-Nuts combine in one unit the advantages of both a nut and a lock washer. They are self-locking and vibration-free, which eliminates the cost and labor involved in the use of lock washers. For both machine screws and tapping screws they range in size from No. 4 to ¼ in.

### EXPANDS RESEARCH PROGRAM

Tripling of its research facilities has been announced by the United Lacquer Manufacturing Company, producers of industrial finishes and protective coatings. The expansion will consist of construction of a new laboratory building and taking over factory space now being used for other purposes.

### BUY OPTIMUS PATENTS

The purchase of Optimus Equipment Company patents, trade marks, manufacturing rights, sales rights, engineering drawings and that machinery and inventory pertinent to the vapor degreasing business has been announced by Topper Equipment Company of Matawan, New Jersey. Machinery included are industrial vapor degreasers and automotive degreasers formerly manufactured by the Circo Products Company of Cleveland and sold under the trade name Circo.

### CARBORUNDUM SELLS SANDER

The Cone-Loc Drum Sander, a cushion-type split drum which makes it possible to use coated abrasives in low-cost strip form, is now being sold exclusively through The Carborundum Company and the distributors of Carborundum coated abrasives, according to an announcement from American Diamond Saw Sales of Portland, Oregon, the tool's producer.


# FREE BARREL FINISHING

This 22-page booklet is guaranteed to open your eyes! It gives you the inside story of advanced barrel finishing as never told before!

WRITE TODAY FOR YOUR FREE COPY

22 PAGES OF FACTS

**CIRCO Supersheen**

AMERICA'S LARGEST MFGR. OF ADVANCED BARREL FINISHING EQUIPMENT, MATERIALS & COMPOUNDS

ALBERT LEA, MINNESOTA D-12

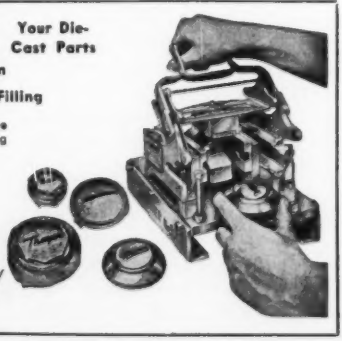
*Circle No. 8 on the Reader Service Card*

# ENAMEL FILL Your Die-Cast Parts

**In Color With Lettering and Design**

**5 TIMES FASTER Than Hand Filling**

The Acroprinter illustrated shows only one type of machine we build for color filling of lettering and design with enamel. Send samples of parts you wish to fill for estimates.



The ACROMARK Company

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# PMM INDUSTRY NEWS

## J. F. HELSEL TO MANAGE WEL-MET'S SALEM PLANT

The Wel-Met Company of Kent, Ohio, producers of self-lubricating bearings and structural and mechanical parts from powdered metal, have announced the appointment of J. F. Helsel as manager of their No. 2 plant now under construction at Salem, Indiana. Mr. Helsel has been with the

J. F. Helsel

company since 1946 and was, prior to the present promotion, assistant works manager of the Kent plant.

The Salem factory, which will cost upwards of half-a-million dollars, should be in operation by the first of the year. It will be devoted to the production of powdered metal parts for the armament program according to Thomas L. Robinson, Wel-Met president.

Wel-Met began operations in Kent in 1946 with only six employees as a division of the S. K. Wellman Company of Cleveland. In July of 1947 a group of Cleveland and Hudson, Ohio industrialists purchased the firm. Since that time production has steadily increased and now the Kent plant employs 125 people. The new facilities in Salem will add 100 more employees to the payroll.

## L. S. NUNN DIES

Miss Laura S. Nunn, secretary and treasurer of the C. M. Grey Manufacturing Company, East Orange, New Jersey, died October 27th.

## FINANCE DRILLING FOR ZINC IN CALIFORNIA

In a move designed to combat the critically short supply of zinc, the Defense Materials Administration has entered into an agreement with the


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but MAGNESIUM? yes!
or ZINC? yes!

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THE
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ALUMINUM DIE CASTING
THAT
IS SETTING NEW STANDARDS
IN DIE CASTING
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Glidden Company for the United States government to bear half the cost of exploratory diamond drilling on Glidden's zinc properties in Shasta County, California.

Previous estimates indicate the properties contain about 225,000 tons of zinc ore. Purpose of the present estimate will be to confirm this tonnage. If exploratory drilling confirms the reserves of 225,000 tons, underground mining operations will begin at the earliest practicable date.

---

### R. N. BLAKESLEE DIES

Robert N. Blakeslee, vice-president and director of engineering of Ajax Electrothermic Corporation, Trenton, New Jersey, died suddenly October 17th. Mr. Blakeslee had been associated with Ajax Electrothermic for 24 years, the last ten of them as vice-president.

---

### EXPLAIN COPPER SHORTAGE

Four reasons have been given by the National Production Authority, U. S. Department of Commerce, for the present critical copper shortage. They are the increasing difficulty in obtaining ore from U. S. deposits, lowered imports from Chile, reduced U. S. production because of strikes and the drying up of scrap supplies. The NPA also said that fourth quarter copper allotments will not be completely filled.

---

### OPEN RESEARCH LABS

E. M. Scott Chemical Company, manufacturers of No Weld die lubricant, has opened a new research laboratory and sales office at 241 West Jefferson Street in Los Angeles, California.

---

### PROPOSES MORE POWDER USE

Expanded use of Oilite metal powder products to relieve the pressure of some machine tool shortages and reduce expense and time needed to make military items has been proposed by A. J. Langhammer, president of the Amplex Division of Chrysler Corporation.

## AUTOMATIC BARREL PLATING MACHINE EXHIBITED

This huge Stevens Super "E" full automatic barrel plating machine was on exhibition at the Metals Show in Detroit. Manufactured by F. B. Stevens, Inc., the machine was designed for cleaning, pickling, plating and drying of bulky metal parts in large volume. Shown is the automatic unloading station with hopper for receiving processed parts.

## SWISS WEAVING MACHINE

continued from page 35

*of the machine on a roller chain fitted with shuttle pushers shown in Figure 5.*

*The first shuttle pushers were made from a medium carbon, low alloy steel sheet, blanked and*

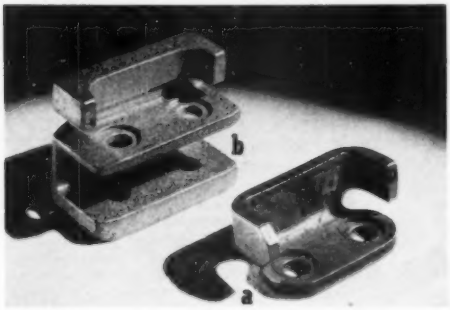


FIGURE 5

*bent as shown in Figure 5a. In operation these pushers tended to break at the sharp bends and had to be discarded.*

*The investment casting designed to replace the stamping is shown in Figure 5b. The casting is made of Solar steel and hardened to 50-55 Rockwell C.*

*This part is one where manufacturing economy had to be sacrificed for operational reliability. The casting when completely machined as needed costs considerably more than the stamping, but the increased reliability more than compensates for the increased cost.*

More and more manufacturers are turning to die castings made from magnesium and aluminum alloys. They are being selected because these new lightweight, yet tough, metals greatly decrease the weight of products. Also, through die casting, greater scope is offered for turning out the designers' ideas—allowing more freedom of design.

The weight factor is of utmost importance to the manufacturer of such a specialized piece of equipment as a Chain Saw. He must keep the weight of his product down—have it built light for portability—and through this weight reduction reduce worker fatigue—giving greater productivity. These lightweight metals must be tough. Leading manufacturers of chain saws are having various components, such as motor parts, covers, gas tanks, housings, handles, shrouds and fans, etc., die cast for their equipment from magnesium and aluminum alloys.

Whatever your portable tool requirements are or whatever you produce that has to be pushed, lifted or carried, you can safely depend on the versatility of these new tough lightweight metals. They are being successfully die cast by LITEMETAL DICAST, INC., an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs—little machines for little jobs . . . the right sizes and types of the most modern die casting equipment. Our facilities are complete for producing parts from the size of a button to large cable spools.

*Remember,* even comparatively simple dies can be used to die cast parts at lowest cost conditions and great savings can also be made in labor formerly required for machining and finishing.

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Investment Casters **Prefer**
**VAN DORNS** for
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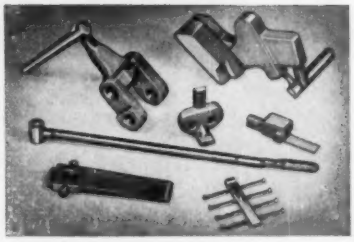
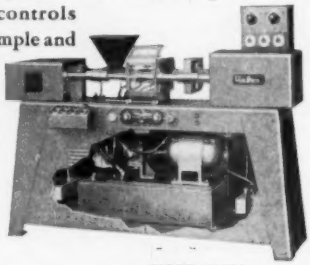
Typical precision parts produced by investment casting, using styrene patterns molded to .003" tolerances on Van Dorn Presses.



**Semi-Automatic Injection Press**
—2-oz. capacity. This ultra-modern press has push-button controls that are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.



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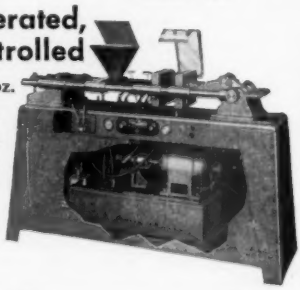
**Power-Operated, Lever-Controlled Presses**—2-oz. or 1-oz. models. Have many automatic and safety features.

MODEL H-200



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### *Investment casting gives outstanding cost reduction*

*After the shuttle has been returned to the starting side of the weaving machine it must be lifted into position so that another cycle can be started. The shuttle*

FIGURE 6

*lifter that does this was first designed as a forging onto which machined parts had to be fastened a total of 13 parts. This assembly is shown in Figure 6 together with the investment casting that replaced it. Cast in Airdi steel and hardened to 52-60 Rockwell C the investment casting ready for use on the weaving machine cost 82 percent less than the former assembly.*

### *Beryllium copper used for castability, wear resistance*

*Some parts of the weaver may not be oiled even though they are subject to a considerable amount*


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IN ONE PIECE!

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SAE 1020

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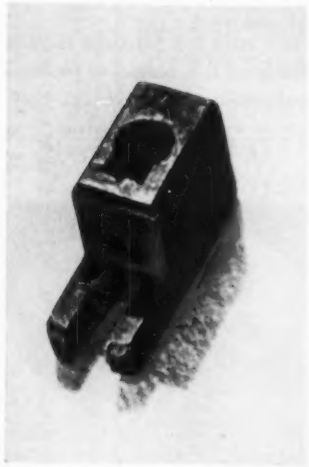

FIGURE 7

*of wear. The guide illustrated in Figure 7 is typical of such a part. Four of these guides are used per machine and are so located that they may not be oiled. To secure the necessary wear resistance and to secure good castibility in such a small piece beryllium copper was chosen as the casting alloy. Heat treated to 40-44 Rockwell C this little guide functions admirably in the as cast condition.*

## Brazed assembly redesigned for investment casting

*The expeller, Figure 8, is a portion of the mechanism that pushes the shuttle onto the conveyor chain. As originally conceived this piece was designed as two forgings and*

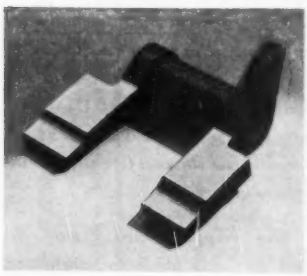

FIGURE 8

*a screw machined pin. The forgings were positioned by and held together with the pin. Such an assembly was difficult to align properly and left something to be desired in the line of rigidity and operational reliability.*

*This expeller is one of the many parts that was redesigned for investment casting when the first study of the machine was made. Not only did investment casting give a more rigid and probably less expensive part, but it allowed redesign to give a more desirable shaped part from an operational stand point. The expeller is cast in Airdi steel, hardened to 60-64 Rockwell C. Only one oil hole needs to be drilled and two faces ground and polished as finishing operations on the casting. Otherwise it is used in the as cast condition.*

*Some of the other investment castings used on the Warner & Swasey Sulzer weaving machine are shown in Figure 9.*

*The pawl shown in Figure 9a is a single casting replacing three stampings and two rivets. Cast in*

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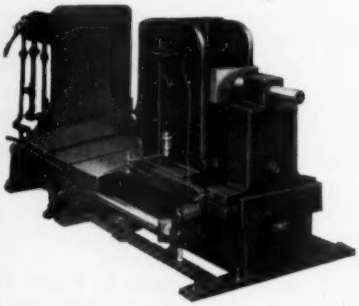

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*Airdi steel and hardened to 56-60 Rockwell C it helped to free men and machines even though there was no manufacturing saving.*

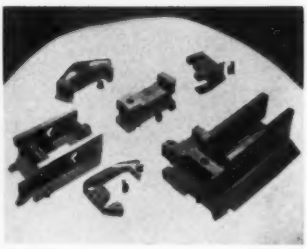


FIGURE 9

*The filling-end gripper, Figure 9b. Two of these are used per machine. These grippers were originally designed by Warner & Swasey as investment castings. They are cast of an SAE 4615 steel, hardened to 54-58 Rockwell C and the polished end nitrided. The hole and counterbore are drilled and reamed after casting.*

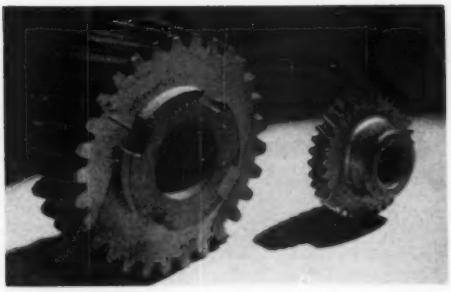
*Figure 9c is a precision cast slide block. Here, one casting has replaced two stampings and two spacers. The originally designed part was difficult to make and hard to maintain in the necessary alignment and rigidity. Cast in Airdi and hardened to 60 Rockwell C the part now gives all of the desired characteristics but shows a five percent increase in cost.*

*The gripper cam, Figure 9d was formerly made by machining from bar stock. As redesigned and investment cast in Airdi steel there is a 20 percent reduction in manufacturing cost.*

# *SIMPLIFIED SOLUTIONS*

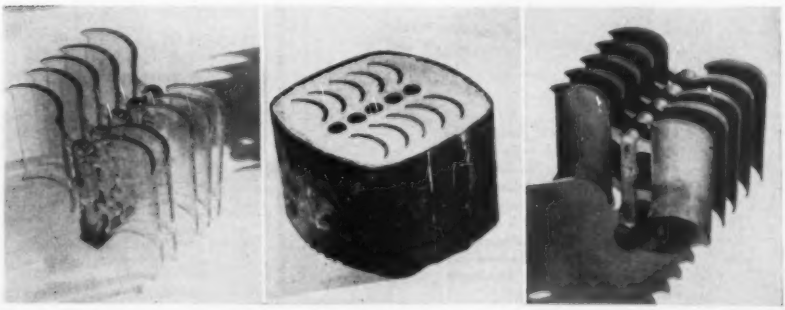
## *for production problems*

SMOOTH, HARD FINISH of these die cast aluminum parts for jet aircraft radar antenna helps to reduce the abrasive effect of the airstream when flying at high speeds. This antenna was once considered for production by sand casting, but by hollowing it out to save stock and by eliminating all secondary operations except for flash removal and straightening, die casting has proved to be the most economical way to form it. Mount Vernon Die Casting Company of Mt. Vernon, N. Y., produces these parts for the Technical Appliance Corp. The decision to make this antenna unit in two pieces arises from the fact that a groove on top for a rubber sealing gasket against weather would have been an elaborate machining operation. It can now be formed integrally in the casting.



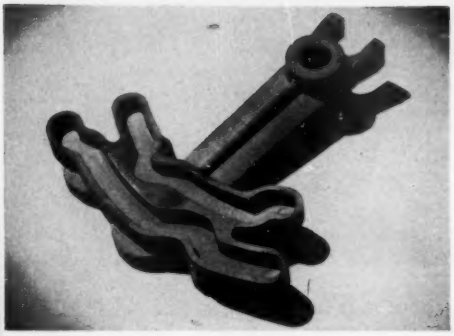
HELICAL GEARING is one of those "special jobs" which represents the steady advancement of tooling skill on the part of the powder metallurgy industry. Once regarded as an impossible production job, these two helical gears in brass powder are now in routine production at Powdered Metal Products Corp. of America in Franklin Park, Ill.

THE USE OF polystyrene patterns for the investment casting of blades for a gas turbine engine is illustrated ***below.*** As cast by Haynes Stellite Company of Kokomo, Ind., the first step is the injection molding of patterns from Bakelite styrene. The patterns are then mounted in clusters, ***left;*** placed in a flask and covered with a refractory silica investment bonded by ethyl silicate, ***center;*** and after the polystyrene patterns are burned out in a gas fired furnace, molten metal is poured into the cavity to produce the cluster of castings, ***right.*** Gates are cut off and ground smooth. The styrene is reported to be a less expensive pattern material when casting quantities are high enough to absorb high mold costs. Advantages of this pattern material include strength and resilience for durability during handling, together with a high degree of uniformity and accuracy. Section as thin as .012 can be made with these patterns.



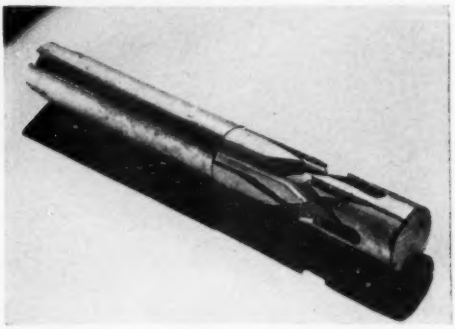
# *SIMPLIFIED SOLUTIONS*

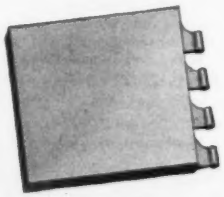
## *for production problems*



TO TRANSLATE MOVEMENT of a shift lever to complex gear movements, this shifter, above, for the Indian Motorcycle is investment cast in steel by Midwest Foundry of Coldwater, Mich. The complex shape of this part could probably not be produced in any other manner in steel and still have the required accuracy and surface finish. As a sand casting, the close dimensions and smoothness could be secured only by complex machining operations. This is equally true of a forging, while to make it from bar stock would result in exorbitant cost.

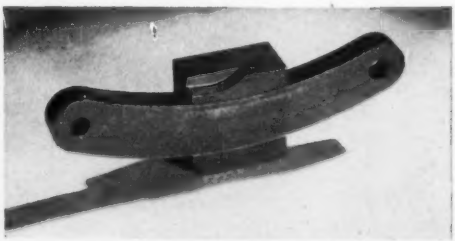
MULTIPLE CAM SURFACES formed around the entire circumference of cam follower, below, have been cast in aluminum by the Universal Casting Corp. of Chicago by the plaster mold casting process. Except for minor machining on the shank end, the follower is ready for use in the as-cast condition.





BROACHING TOOL shown above was cast to close tolerances in high speed tool steel by the investment casting process. The Adapti Company of Cleveland, Ohio, casts this part so accurately that it is necessary only to sharpen the cutting edge before putting the tool into use. The cost is about one-fourth that of machining the tool.

WHEN PRODUCED BY NORMAL MACHINING METHODS, these mating parts for an industrial sewing machine cost $2.00 per set. Close fit between the slide block and segment is required, with parallel surfaces held to .002 tolerance and the majority of dimensions ± .005. Now, as manufactured by the Amplex Div., Chrysler Corp., of Detroit the total cost is $0.115 per set. Formed by powder metallurgy from Super-Oilite, the parts are self lubricating and have smooth and quiet operation.



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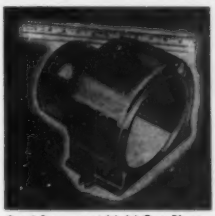
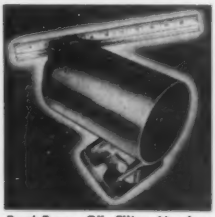


Semi-Permanent Mold One-Piece, Oil Burner Housing Eliminates Costly Machining



Truck-Type, Oil Filter Housing Cast with Integral Inserts for Oil Passages

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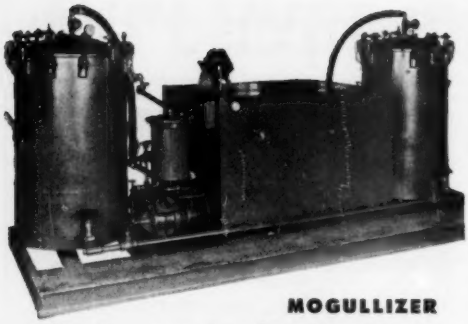

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Any standard impregnating material can be used but for top efficiency we recommend our Mogul Cast Seal.

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NEW PRODUCTS

continued from page 51


### SCREW LOCKING INSERTS REQUIRE NO SPECIAL TOOLS

*Brush Screw Locking Inserts*
*Brush Screw Locking Insert Co.*

SPECIAL FEATURES: Inserts are installed without special tools by pushing them into plain round holes. Design eliminates need and cost of lock nuts or washers and their assembly costs and permits installation and use from only one side of the work.

SPECIFICATIONS: Are stocked in 17ST aluminum, 3/16" long, for use in all thicknesses of materials from 3/16" and up. May be made of any metal and furnished in special lengths for all size screws.

*For additional information circle No. 112 on the Reader Service Card*

### DRILL AND GRINDER IMPROVEMENT

*Sterling Drill and Carbide Grinder*
*McDonough Manufacturing Co.*

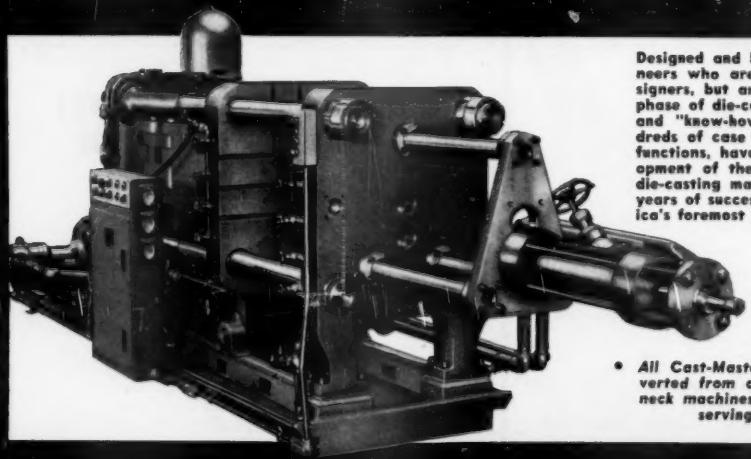
SPECIAL FEATURES: Simplified adjustment to compensate for grinding wheel wear and thereby improvement in accuracy of setting machine for various drill diameters. Permanent mounting of diamond wheel dresser on drill grinding wheel guard,—making it available for easy dressing of wheel. When not being used swings back so that it does not interfere with drill grinding operation.

SPECIFICATIONS: Graduated quadrant has been added on carbide tool grinding side of table making it simple to set clearance angles accurately. A diamond holder for dressing wheel on this end is also furnished as standard equipment.

*For additional information circle No. 113 on the Reader Service Card*


# CAST-MASTER *Die Casting Machines*

★ Rugged All-Steel Construction ★ New Hydraulic System Minimizes Fire Hazards ★ Easy to Operate



Designed and built by top-notch engineers who are not only machine designers, but are well versed in every phase of die-casting. Their knowledge and "know-how" combined with hundreds of case histories on die-casting functions, have resulted in the development of the CAST-MASTER . . . a die-casting machine with a record of years of successful operation in America's foremost plants.

**Write For Complete Specifications!**

• *All Cast-Master models can be converted from cold chamber to gooseneck machines and vice versa — thus serving a dual purpose.*

**Manufactured by MILLER-TAYLOR TOOL CO. Cleveland 3, Ohio, U.S.A.**

*For additional information circle No. 41 on the Reader Service Card*

## PROMOTIONS AND APPOINTMENTS

BILL DE VALLE to technical service field representative covering part of the Los Angeles territory for *Smith-Davis Co.* of Los Angeles, manufacturers of industrial, trade sales and maintenance finishes.

SIDNEY G. MACY as technical service field representative to cover part of the New Jersey territory for *Maas & Waldstein Co.* of Newark, New Jersey, manufacturers of lacquers, enamels and synthetic finishes.

HANS J. HEINE to chief metallurgist of Barberton Division of *Rockwell Manufacturing Company*. This division manufactures Nordstrom valves.

J. P. DOAN to superintendent of extrusion operations, Magnesium Department, Madison Division, *The Dow Chemical Company*.

F. O. SPENCE to the newly created post of regional sales manager for the *Diversey Corporation* of Chicago, suppliers of cleaning compounds used in preparing metal surfaces for finishing operations. R. C. PERRY will replace Mr. Spence as Pacific Division manager.

HENRY COLLINS as office manager for *Arthur Colton Company, Division Snyder Tool & Engineering Company's* new plant in Paducah, Kentucky, which has been specially re-equipped for the production of precision punches and dies.

HARRY F. ALLEN to the sales force of *Hanson-Van Winkle-Munning Company*. Mr. Allen will make his headquarters in Cleveland, Ohio.

LEROY A. HUGHES to secretary-treasurer and general manager of the *Glenvale Products Corp.*

JAMES H. WOLCOTT as sales-manager of the *Machinery Division, Reed-Prentice Corp.* of Worcester, Massachusetts.

DR. CHARLES H. MOORE to head of the Metal and Ceramic Division of

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Affiliate of Tri-State Plastic Molding Co., Inc.

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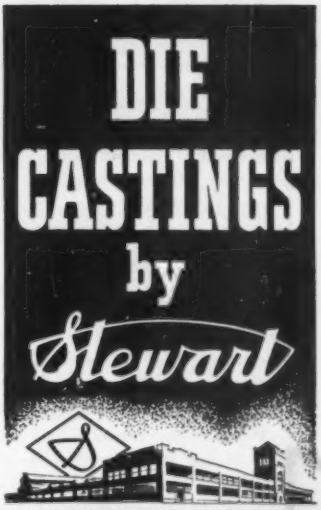

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*P. R. Mallory & Co., Inc.* Dr. Moore is the inventor and developer of rutile gems, often referred to as titania.

RICHARD W. STEIGER as designer for *Sundberg-Ferar,* Detroit industrial designers.

DON E. WEAVER as technical representative in the metal cleaner department for the Indiana-Southern Ohio territory for the *Cowles Chemical Company.*

DENNIS ORD to the research and development laboratories of *Sam Tour & Co.* of New York City where he will specialize in the chemical analysis of titanium and titanium alloys.

THEODORE R. TREADWELL to sales manager for *Clover Manufacturing Company's* entire line of coated abrasives and grinding and lapping compounds.

HARRY OLDHAM to the engineering staff of *Sutter Products Company,* manufacturers of special foundry equipment.

ROBERT C. ANDERSON to sales engineer for *Detroit Electric Furnace Division,* Kuhlman Electric Company.

ROGER E. GAY, president of *The Bristol Brass Corporation,* as president of the American Standards Association.

LLOYD R. JACKSON to assistant director of *Battelle Memorial Institute,* Columbus, Ohio. Also four members of the Institute's research staff to supervisory positions; DR. HORACE J. GROVER as supervisor of research on fatigue and structural analysis, ARTHUR D. SCHWOPE as supervisor of research in mechanical metallurgy, HENRY A. SALLER as supervisor of research on special metallurgical materials and CHARLES F. LUCKS as supervisor of the Institute's instrument division.

DR. MARTIN G. VORHAUS as general medical director of the *Doehler-Jarvis Corporation.*

GEORGE J. PYSHE to the designing staff of *Sundberg-Ferar,* industrial designers.

HARRY SCHWARTZBART as a research metallurgist in the metals research department at the *Armour Research Foundation* of Illinois Institute of Technology.

OLIVER S. DEHAVEN to chief engineer and ERIC LINDENBORG to the engineering division of *The Vonnegut Moulder Corporation.* Mr. Lindenborg will be in charge of demonstrations and experiments related to Vonnegut grinding and polishing equipment.

## PLENTY OF ALUMINUM FORECAST FOR MID-1953

Reports from the fall meetings of the Aluminum Association indicate that the aluminum shortage should be over by mid-1953. Increased production due to industry expansion is counted on to turn the trick. However, immediate alleviating effects will not be felt until sometime next year.

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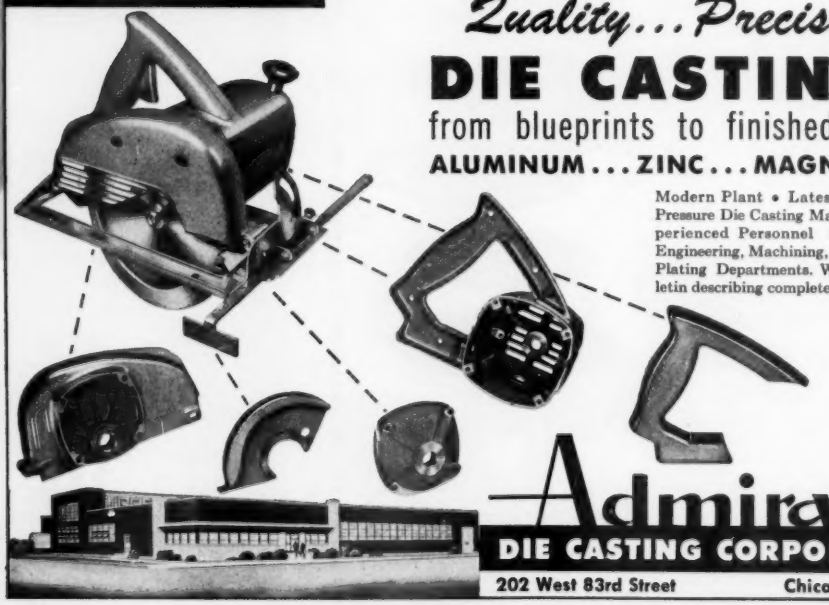

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No. 41. EQUIPMENT FOR DIE CASTING made by the Miller-Taylor Tool Co. is illustrated and described in literature offered by the company. Miller-Taylor specializes in different size zinc and aluminum die casting machines.

No. 45. A NONFLAMMABLE HYDRAULIC FLUID, Monsanto's Pydraul F-9, developed primarily for use in die casting machines, is described in a technical bulletin offered by the Monsanto Chemical Co.

No. 50. LARGE, NEW DIE CASTING PLANT is described and illustrated in a booklet called "The Inside Story" published by New England Die Casting Co.

No. 52. REMOVAL OF CARBON, GREASE, DIRT AND PAINT from metal products with two new solvent detergents is the subject of a 24-page illustrated booklet available from Oakite Products, Inc.

No. 57. INVESTMENTS FOR CASTING with the lost wax process are the subject of literature available from Pre-Vest, Inc. Pre-Vest specializes in the production of investments for ferrous and non-ferrous investment casting.

No. 72. A BRIGHT FINISH FOR DIE CASTINGS which is made up of a .0003 zinc plate and a Unichrome Clear Dip treatment is described in a bulletin offered by United Chromium, Inc.

No. 74. INVESTMENT CASTING PATTERNS can be made from styrene on a plastic molding machine. Information on machines designed for this purpose can be obtained from the Van Dorn Iron Works Co.

SIMPLIFIED SCHEDULING
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these electrical fittings, fractions of ounces pared from each connector represent worthwhile savings in total load.

Aluminum die castings have the proper combination of lightness-strength-durability to perform properly. A high silicon alloy is used which is castable in thin sections, has high tensile strength to resist normal abuse, has suitable aging characteristics and freedom from corrosion, when properly treated.

Cost is strictly competitive, and every opportunity is taken to reduce manufacturing expenditures where it can be done within specifications. Thus, two size ranges of plug shells are either die cast or cut on screw machine entirely upon the basis of cost. The smaller size are less expensive on screw machine, the larger sizes are cheaper as die cast.

The two factors affecting this comparison are: 1) the scrap factor, and 2) the secondary operations. On larger diameter pieces, the screw machine wastes considerable metal, and involves more extensive secondary operations.

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## LETTERS TO THE EDITOR

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On the other hand, you refer to plain carbon steels with ultimate tensile strengths of up to 150,000 p.s.i. and while I believe that these values can be obtained in the laboratory and have, in fact, obtained them myself experimentally, I do not believe 150,000 p.s.i. represents a fair value of parts made by mass production techniques. — G.S.

*The data in Table I referred to above were taken largely from current literature. While the high tensile strengths for impregnated iron parts are obtainable, they are generally parts containing carbon and are subsequently hardened. Goetzel, for example, gives the tensile strength of copper impregnated carbon-free parts as ranging from about 46,000 to 65,000 psi, depending upon the amount of copper present. This table should probably have specified that carbon-free material was meant.*

*For plain carbon steel powder parts, the high tensile strengths are being secured where high forming pressures are used and sintering is carried out in a carburizing atmosphere. Adequate control of the carbon content and proper heat treatment after sintering can give parts having an ultimate tensile strength of 150,000 psi. There is, as yet, relatively limited use of these parts due to their higher cost.*

*Most of the carbon steels now in use are manganese-free, or very low in manganese. This materially reduces the hardenability and hence the ultimate tensile strength. Where an iron powder containing about 0.50 percent manganese is used, the ultimate strength of 150,000 psi can be secured.*

*Perhaps for a broad general set of values to guide designers, a more conservative tensile strength might have been listed at 120,000 psi for carbon steels even though the higher values are commercially produceable.—Ed.*


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**During this past year Die Castings magazine, which heretofore had only covered the die casting industry, widened its scope to include the fields of powder metallurgy, plaster mold casting, investment casting and permanent mold casting. The first issue of the new publication, Precision Metal Molding, appeared in September. Therefore, all articles listed as appearing in issues through August will have run in Die Castings, whereas from September on they were published in PMM.*

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drive hole broached. No other machining operations are required. This change in design has eliminated rejects due to cracking of the housing and has shown a manufacturing cost reduction of from 18 to 25 percent.

The handle body is another original die casting. More machining than is usual has to be done on this piece. Since the switch, power transmission device, turning mechanism are all housed in this one piece, its design is more closely held, dimensionally, and is more complex than most of the other parts.

The horizontal hole is a stepped one changing from ½ inch to 13/16 inch and must be reamed after casting. The vertical hole onto which the handle fits is also reamed to secure precise alignment and thus prevent binding. Two faces where the handle and the switch assembly fit on are machined flat and the clamping slot to hold the body rigidly to the tilting mechanism is milled.

Earlier, mention was made that the surface finish on all of the die casting is the same. As received from the caster, the parting lines and sprue are ground off and the parts rough polished. After machining the only operation that the plater must do is to give the pieces a final polish, degrease, and then plate. Formerly, the plating procedure was copper, nickel and then chromium. With present restrictions now in effect, the nickel plate is eliminated and the die cast parts given first a bright copper plate and then a chromium plate.

Among other products of the Reelite Division of Appleton Electric Co. are the Retract-O-Reels and the Reelites.

The Retract-O-Reel is a spring operated tension device designed to counterbalance automatic tools such as power operated screwdrivers, nut runners, etc., used on assembly lines. The tool is hung, in the usual manner, just in front of and within easy reach of the operator. Above the tool a Retract-O-Reel is suspended and the cable from the reel attached to the tool. The tension on the cable is so adjusted that the tool can be drawn down into operating position with a minimum of effort by the operator and will, upon release, be returned to its overhead position.

The outer casing and the reel body are aluminum permanent mold castings made from a 12 percent silicon aluminum alloy. These two castings, the body and the cover plate, require only machining of the flanges and boring all holes. Concentricity between the bushing (a self lubricating ᵍ powder metal bushing pressed into place) and the outer face of the reel is maintained at 0.007 total indicator run-out. Three holes are provided for fastening the reel cover to the body. In addition a fourth hole is drilled in both the cover and the body of the reel to take the pivot pin on which the retractor spring is an-

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chored. The part requires no surface finish at all.

The case of the Retract-O-Reel is made up of two identical halves. As received from the caster, the center bore is reamed, the faces surfaced for fit and two holes drilled, one for an eye bolt for a hanger and the other to allow the 3/16 wire cable to feed off of the reel to the tool. No particular concentricity requirement is needed on the center bore as long as the reel runs freely in the body. The holes holding the two portions together must, of course, be drilled and in one half drilled and tapped.

As a surface finish the body is given a coating of air drying lacquer, sprayed on.

The light duty Reelite for holding a two conductor cord for a drop light or trouble light is largely a pressed steel construction. It does have, however, one interesting die casting. The bracket connecting the reel body to the swivel mounting head is a zinc die casting. This bracket, shown in the


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accompanying figure appears to be a typical punch press part. Due, however, to the curved surfaces onto which it must fit, the edge must be feathered. Such shaping is impossible on a press and would represent a difficult machining job.

As a zinc die casting, this bracket is readily made with an adequate feathered edge so that it can be used as received from the caster with no machining operations needed. In another respect, this part is unusual. The wall thickness is uniformly less than 1/16 and the mounting holes and conductor cut out are formed in the trimming operation rather than in the die casting operation.

### *Impregnated powder metal pawl molded to close limits*

One other part on this model of Reelite is of particular interest. The ratchet pawl shown is made from an oil impregnated 90 percent iron-10 percent copper powder mixture. As furnished by the vendor, the ratchet is received ready for installation.

Several close tolerances are held by the molder on this piece. The bore has a tolerance of + 0.000 — 0.001 and the thickness is held to + 0.000 — 0.004. Specifications call for a maximum radius in the tip of the pear shaped hole of 0.015 and about the same radius on the tip of the pawl. The minimum tensile strength is 30,000 p.s.i. All of these tolerances and specifications are met by the molder.

This particular piece was orginally designed as a powder part so that no accurate cost differential figures are available. It is estimated, however, that if the piece were made by other methods the cost would be at least double that of the powder part.

### *From sand casting to plaster mold casting*

On the heavy duty industrial Reelites one part of special interest is the collector ring. This ring, illustrated, is made in two sizes and each Reelite carries two or more rings. This ring is a plaster mold casting.

Originally, the rings were made as sand castings but the exceptionally high percentage of rejects caused by pits on the surface or cracks in the thinner sections led to adoption of the plaster mold castings.

As received from the caster, these rings need to have the outer surface machined and one edge faced. In use, they are mounted in plastic so that no other machine work needs to be done on them.

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Intensified research to make available for essential defense purposes as much stainless and high alloy steel as possible and to assure supplies of stainless steel for worthwhile civilian purposes is being carried out by steel companies and company sponsored laboratories in colleges and universities, according to a report by the Committee of Stainless Steel Producers of the American Iron and Steel Institute.


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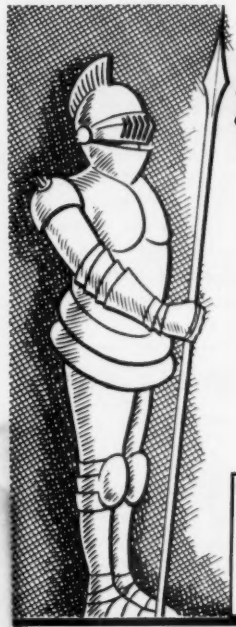

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2—Petro Model W6A atomizing oil burners with controls.
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1—Home-made, space between die bars 28" x 28", with furnace and controls, hydraulic.
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## ERRATA

In the article *Inspection Of Investment Castings* in the November issue of Precision Metal Molding reference was made to the mottled appearance produced by finely dispersed oxide in beryllium copper castings. This should have read, "Certain types of metal, notably beryllium copper, aluminum and high chromium nickel alloys tend to give a mottled X-ray pattern that to the uninitiated would seem to indicate an extremely porous casting. The cause of this mottling is not definitely known, but is presumed to be due to variations of penetration caused by grain or crystal orientation with respect to the direction of the X-ray beam. Presence of mottling seldom has any deleterious effect."

In the article, *Infiltration Powder Metallurgy*, by Claus G. Goetzel appearing in the September 1951 issue of Precision Metal Molding, the caption for the illustration on page 91 incorrectly identified the infiltrant for the tungsten carbide turbo-jet vanes as copper rather than nickel.

Also a caption omitted from an illustration on page 103 reads, "Pictured are three steps in the production of an extrusion die from infiltrated titanium carbide. Left is a sintered blank; center, a cored and infiltrated die; right, a semi-finished die.

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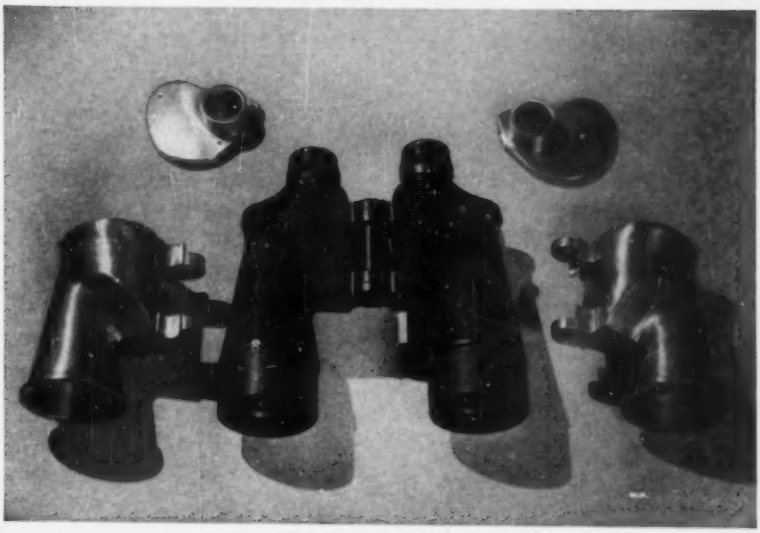

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